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ABSTRACT

As revealed by the mean scores of the countries participating in the Performance Improvement through Strategy Analysis (PISA) assessment of reading literacy, Finland shows the highest reading literacy performance in the Organisation for Economic Cooperation Development (OECD) Finland's performance is significantly higher than that of any other participating country. PISA is a three year survey of the knowledge and skills of 15-year-olds in the principal industrialized countries. In 2000, a total of 265,000 students from 32 countries participated. This book, from the researchers responsible for the implementation of PISA in Finland, tries to open up some perspectives on the possible reasons underlying the high performance of Finnish students in PISA. The book points out that there is no single explanation for the results. It states that the successful performance of Finnish students seems to be attributable to a web of interrelated factors related to comprehensive pedagogy, students' own interests and leisure activities, the structure of the education system, teacher education, school practices, and, in the end, Finnish culture. The book opens up perspectives on this web of explanations not only by analyzing the results of PISA but also by considering some characteristics of the Finnish education system and cultural heritage which, in and outside of school, can be thought to have contributed to Finland's successful performance. Appended are: (1) "Finnish Education System"; and (2) "Teacher Education." (Contains 10 figures and 16 references.) (BT)

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THE FINNISH SUCCESS IN PISA – AND SOME REASONS BEHIND IT

PISA 2000

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OECD PISA

PISA IN A NUTSHELL

A three-year survey of the knowledge and skills of 15-year-olds in the principal industrialised countries

- The survey, conducted first in 2000, will be repeated every three years.
- In 2000, a total of 265.000 students from 32 countries took part.
- Students sat pencil and paper assessments in their schools.
- Students and their principals also answered questionnaires about themselves and their schools. This allowed PISA to identify what factors are associated with better performance.

A new way of looking at student performance

- PISA assessed young people's capacity to use their knowledge and skills in order to meet real-life challenges, rather than merely looking at how well they had mastered a specific school curriculum.
- PISA assessed literacy in three domains – reading, mathematics and science. In 2000, priority was given to reading literacy, with mathematical and scientific literacy assessed in lesser depth.
- Students had to understand key concepts, to master certain processes and to apply knowledge and skills in different authentic situations.
- Information was also collected on student attitudes and approaches to learning.

A unique collaboration between countries to monitor education outcomes

- PISA was co-ordinated by governments of participating countries, through the Organisation for Economic Co-operation and Development (OECD).
- Leading international experts worked to develop an assessment whose results are comparable across different national and cultural contexts.
- PISA improves international information on student outcomes, giving countries benchmarks and regular updates on how students perform against them.

The implementation of PISA in Finland

- In Finland, PISA was conducted by the Institute for Educational Research at the University of Jyväskylä. The project was co-ordinated by Professor Jouni Välijärvi and collaborated by Professor Pirjo Linnakylä, Researchers Pekka Kupari, Pasi Reinikainen, Antero Malin, Eija Puhakka, Viking Brunell, Kaisa Leino, Tiina Nevanpää, Sari Sulkunen and Jukka Törnroos, and Research Assistants Inga Arffman, Seija Haapaviita and Kirsi Häkämies.
- The Finnish PISA survey was funded by the Ministry of Education, the National Board of Education and the University of Jyväskylä.

THE FINNISH SUCCESS IN PISA – AND SOME REASONS BEHIND IT

PISA 2000

Jouni Välijärvi
Pirjo Linnakylä
Pekka Kupari
Pasi Reinikainen
Inga Arffman

INSTITUTE FOR EDUCATIONAL RESEARCH
UNIVERSITY OF JYVÄSKYLÄ

OECD PISA

OPETUSHALLITUS

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FOREWORD

The outstanding success of Finnish students in PISA has been a great joy but at the same time a somewhat puzzling experience to all those responsible for and making decisions about education in Finland. At a single stroke, PISA has transformed our conceptions of the quality of the work done at our comprehensive school and of the foundations it has laid for Finland's future civilisation and development of knowledge. Traditionally, we have been used to thinking that the models for educational reforms have to be taken from abroad. For a long time, we thus turned to Germany for these models. More recently, however, the models have mainly been taken from our Nordic neighbours, especially from Sweden. There is, in fact, even a Finnish phrase saying, 'In reforming school, Finland makes exactly the same mistakes as Sweden. Only it happens ten years later.' Today, thanks to PISA, the situation seems suddenly to have changed, with Finnish schooling and Finnish school practices in the focus of international attention. This sudden change in role from a country following the example of others to one serving as a model for others reforming school has prompted us to recognise and think seriously about the special characteristics and strengths of our comprehensive school.

In this publication, we as the researchers responsible for the implementation of PISA in Finland, try to open up some perspectives on the possible reasons underlying the high performance of Finnish students in PISA. There is, in fact, no one single explanation for the result. Rather, the successful performance of Finnish students seems to be attributable to a web of interrelated factors having to do with comprehensive pedagogy, students' own interests and leisure activities, the structure of the education system, teacher education, school practices and, in the end, Finnish culture. Perspectives on this web of explanations will be opened up not only by analysing the results of PISA but also by considering some characteristics of the Finnish education system and our cultural heritage which, both at and outside school, can be thought to have contributed to Finland's successful performance.

We hope this publication will raise questions and discussions as to how we can continue developing the school for the benefit of society and the young responsible for its future. Therefore, all comments, ideas and questions concerning the publication are welcome. The publication further aims at promoting mutual understanding of the diverse educational solutions found in various countries, which in turn, will hopefully help us to get a better picture of the special characteristics and future developmental possibilities of our own comprehensive school. A possible channel for discussion are the below-mentioned e-mail addresses of the authors.

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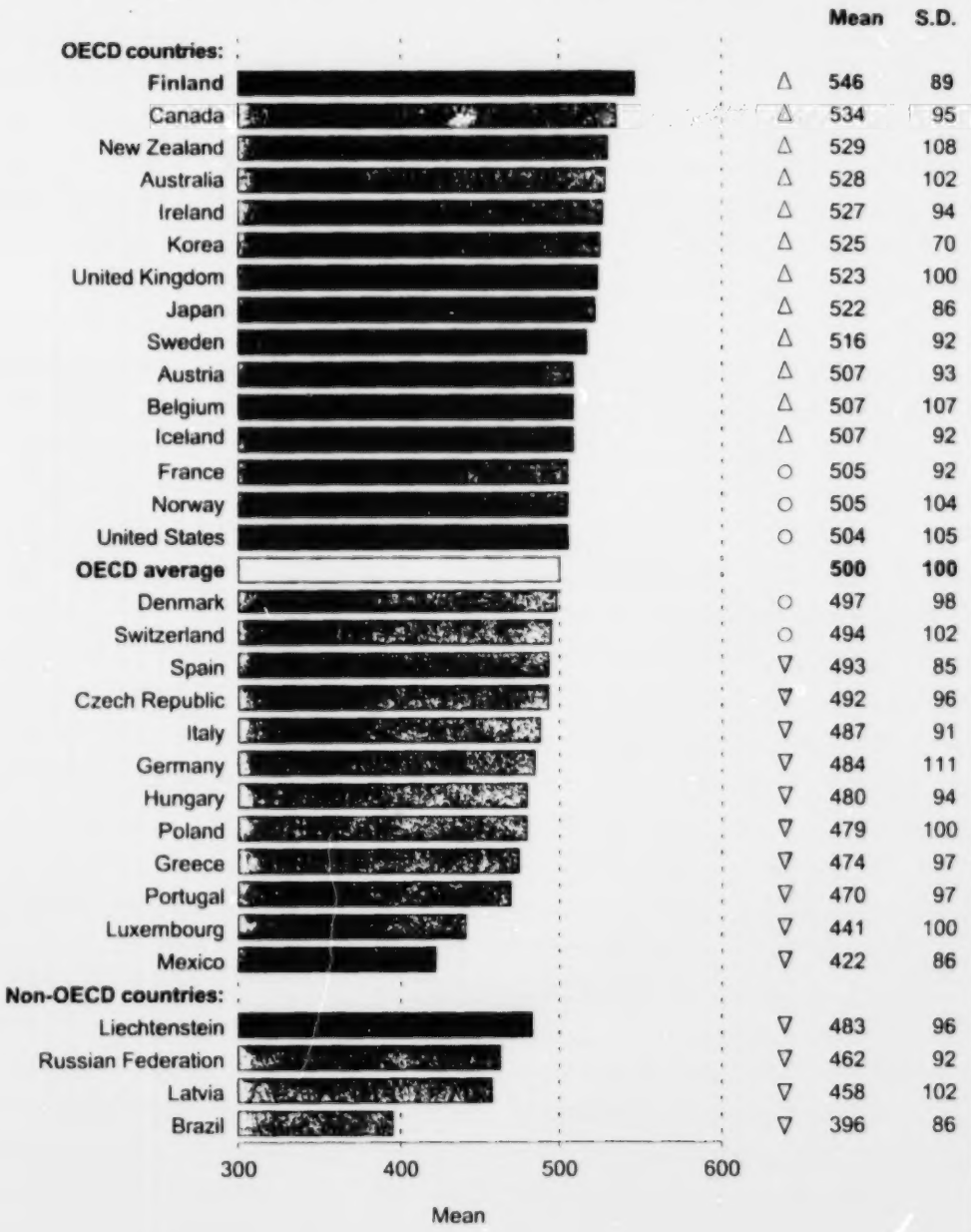
HIGH QUALITY OF EDUCATIONAL OUTCOMES

Reading literacy

As revealed by the mean scores of the countries participating in the PISA assessment of reading literacy (Figure 1), Finland shows the highest reading literacy performance in the OECD; Finland's performance is significantly higher than that of any other participating country. Besides, in Finland high overall reading literacy performance seems to be combined with comparatively *high equality*. This is seen in that in Finland, the standard deviation, illustrative of variation in student performance, is among the smallest in OECD countries.

A comparison of the three subscales of reading literacy displays the relative strengths and weaknesses of Finland's performance. In the light of the national mean scores, Finnish students scored especially high on two subscales – *retrieving information* (556 points) and *interpreting texts* (555 points). On these two subscales, Finnish students significantly outperformed their counterparts in all the other participating countries. In reflection and evaluation, on the other hand, Finland (533 points) ranked third together with Ireland, with Canada and the United Kingdom placed first and second respectively. Finland's performance on this scale, however, was not significantly lower than that of the top countries, yet it suggests that performance in *reflection and evaluation* is not as strong in Finland as it is in retrieving information and interpreting texts.

Figure 1 Mean performance in reading literacy



△ Statistically significantly above the OECD average.
○ Not statistically significantly different from the OECD average.
▽ Statistically significantly below the OECD average.

No statistically significant difference from Finland.
Mean performance statistically significantly lower than in Finland.

To explore variation in student performance, students were distributed across five proficiency levels according to their reading literacy scores. Figure 2, showing the percentage of students proficient at each of the reading literacy levels, attests to great variation in reading literacy performance both between and especially within OECD countries. In every country, there are students who rank among the best performers in reading literacy, yet there are also those whose performance remains at or below Level 1.

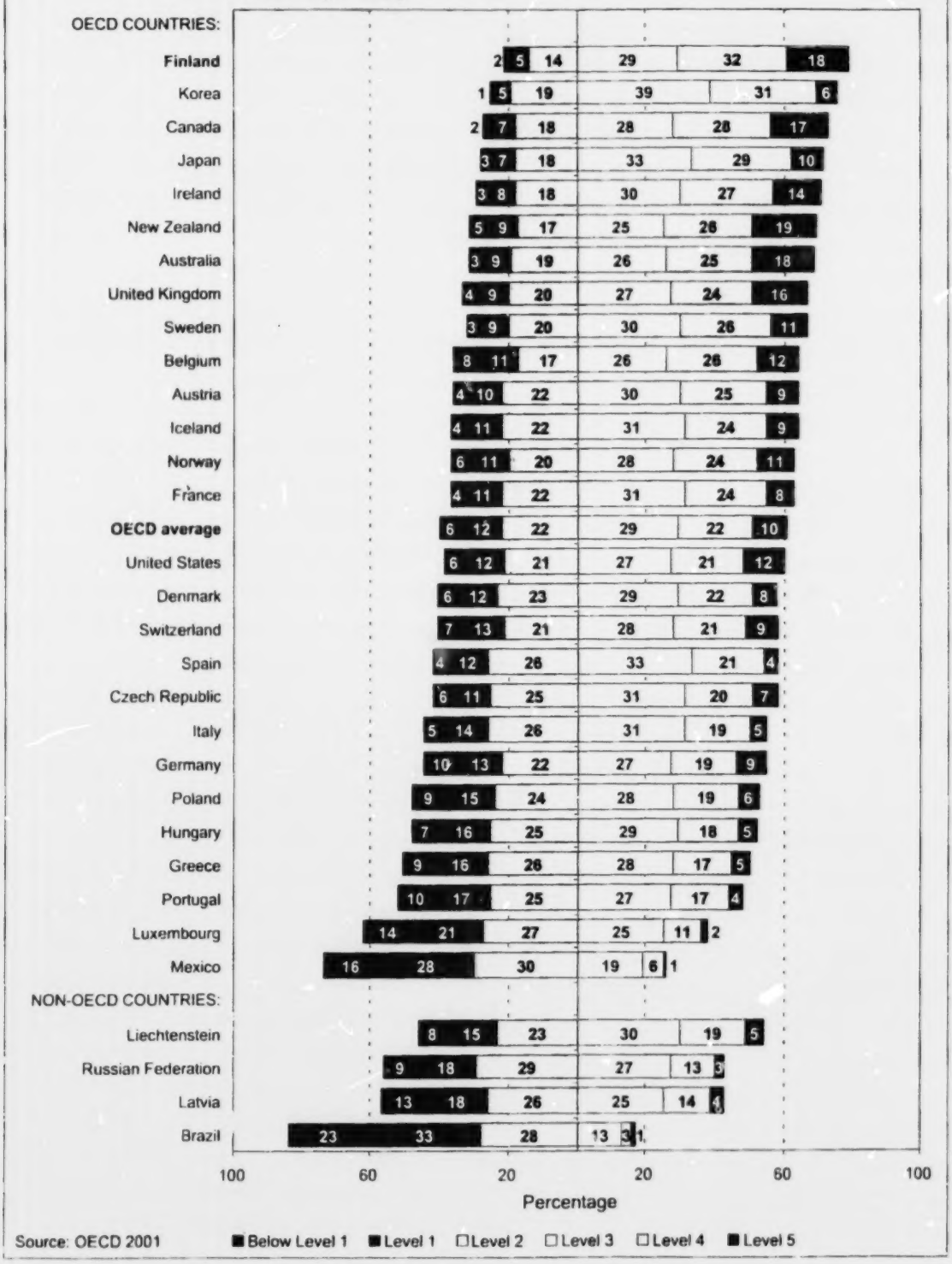
In the combined OECD area, an average of 10 per cent of students reached the highest proficiency level, that is, Level 5 in reading literacy. In Finland, this level was attained by 18 per cent of students, which was the second highest percentage among the participating countries, with New Zealand at the top (19 per cent). High percentages of top readers were also found in Australia (18 per cent), Canada (17 per cent) and the United Kingdom (16 per cent).

Proficiency Level 4 – and hence excellent reading skills – was reached by 32 per cent of Finnish students, the OECD average being 22 per cent. This means that altogether 50 per cent of Finnish students ranked among excellent readers (Levels 4 or 5), while the corresponding figure for the OECD was 32 per cent. Proportions higher than 40 per cent were likewise discovered in Canada, New Zealand, Australia, Ireland and the United Kingdom.

Level 3, again, was attained by 29 per cent of Finnish students. A total of 79 per cent of Finnish students, the percentage being the highest among OECD countries (the combined OECD area averaging 61 per cent), thus reached Levels 5, 4 or 3 and seem to have acquired the literacy skills needed to cope with the demands of learning and work posed by today's knowledge societies. Next to Finland, high percentages were also achieved in Korea, Canada and Japan.

The next proficiency level, Level 2, was achieved by 14 per cent of Finnish students, the corresponding figure for the OECD being 22 per cent. And finally, proficiency at or below Level 1, that is, poor reading skills, was

Figure 2 Percentage of students performing at each of the proficiency levels of reading literacy



Source: OECD 2001

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attained by 7 per cent of Finnish students, as compared to the OECD average of 18 per cent. The only country where the proportion of poor performers was smaller than in Finland was Korea. In the other well-performing countries, the percentage of students at or below Level 1 clearly exceeded that of Finland.

In international comparison, the reading literacy skills of Finnish students proved high quality. Finnish students seem to do exceptionally well in retrieving information and in interpreting texts. In reflection and evaluation, however, top performance appears to be somewhat scarcer. The number of poor readers in Finland is remarkably low by international standards, yet every young person with deficient reading skills risks getting marginalised from further schooling, cultural activities and active citizenship in a society cherishing knowledge, skills and lifelong learning.

The findings of PISA suggest that as a rule Finland has managed to achieve both high quality and high equality of reading literacy outcomes. In guaranteeing gender equality, however, Finland has been less successful – witness the fact that in PISA the gender gap in reading literacy was widest in Finland, that is, 51 points (the OECD average being 32 points). Moreover, the gender differences found in Finland proved significant on all three subscales. In retrieving information the difference was smallest (44 points), and in reflection and evaluation greatest (63 points). In interpreting texts, the difference was 51 points. Compared to previous international reading literacy assessments, the gender gap, on the whole, seems to have widened not only in Finland but also in the other OECD countries.

Mathematical literacy

In the PISA assessment of mathematical literacy, two content areas – *change and relationships* and *space and shape* – were examined. In terms of mathematical strands, the content area of change and relationships was mainly concerned with algebra, functions and statistics, while that of space and

shape consisted in measurement and geometry. The mathematics assessment was based on 31 tasks.

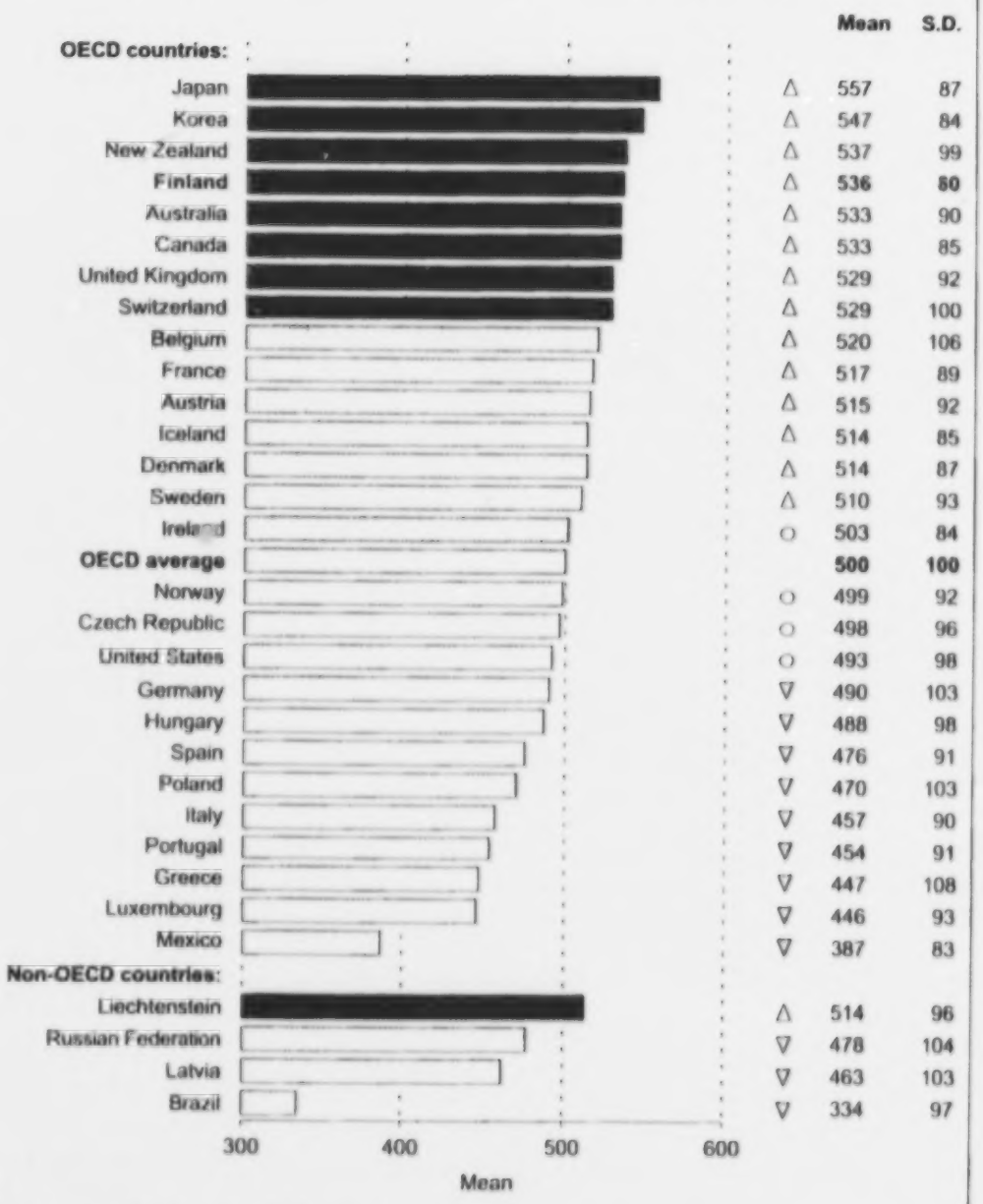
In mathematical literacy, Finland clearly ranked among the best quarter in the combined OECD area (Figure 3). Finland with its 536 points displayed the fourth highest mean performance in mathematical literacy. Of the top countries, only Japan statistically significantly outperformed Finland, while all the other 19 OECD countries had performances significantly lower than that of Finland. Finnish students likewise outperformed their fellow students in the other Nordic countries, who scored at or slightly above the OECD average.

Finland's performance in mathematical literacy also showed high equality, which can be seen in that in Finland the standard deviation for student scores in mathematical literacy was the smallest, notably 80, among OECD countries. Finland, Iceland, Japan, Korea and Canada, that is, the countries with the smallest differences between students were among the best performing countries in the OECD or, at the very least, clearly above the OECD average. The results suggest that high average performance can be achieved by providing all students with similar opportunities for mathematics instruction rather than through explicit differentiation at an early age between types of programmes.

In mathematical literacy, the proportion of weak performers was considerably lower in Finland than it was on average across OECD countries. Thus, only 8 per cent of Finnish students performed among the least proficient 16 per cent of students in the combined OECD area. The percentage equals that of the other best performing countries. The proportion of top performers, in contrast, was higher in Finland when compared to the OECD average, yet remained below the proportions found in Japan, New Zealand, Korea, Switzerland, Belgium, Australia and the United Kingdom.

From the viewpoint of the content areas, performance in Finland was evenly distributed. In both of the content areas assessed, the percentages of correct

Figure 3 Mean performance in mathematical literacy


Mean
S.D.
OECD countries:
Japan Δ 557 87
Korea Δ 547 84
New Zealand Δ 537 99
Finland Δ 536 80
Australia Δ 533 90
Canada Δ 533 85
United Kingdom Δ 529 92
Switzerland Δ 529 100
Belgium Δ 520 106
France Δ 517 89
Austria Δ 515 92
Iceland Δ 514 85
Denmark Δ 514 87
Sweden Δ 510 93
Ireland ○ 503 84
OECD average 500 100
Norway ○ 499 92
Czech Republic ○ 498 96
United States ○ 493 98
Germany ∇ 490 103
Hungary ∇ 488 98
Spain ∇ 476 91
Poland ∇ 470 103
Italy ∇ 457 90
Portugal ∇ 454 91
Greece ∇ 447 108
Luxembourg ∇ 446 93
Mexico ∇ 387 83
Non-OECD countries:
Liechtenstein Δ 514 96
Russian Federation ∇ 478 104
Latvia ∇ 463 103
Brazil ∇ 334 97
300
400
500
600
Mean
Δ Statistically significantly above the OECD average.
○ Not statistically significantly different from the OECD average.
∇ Statistically significantly below the OECD average.
Mean performance statistically significantly higher than in Finland.
No statistically significant difference from Finland.
Mean performance statistically significantly lower than in Finland.

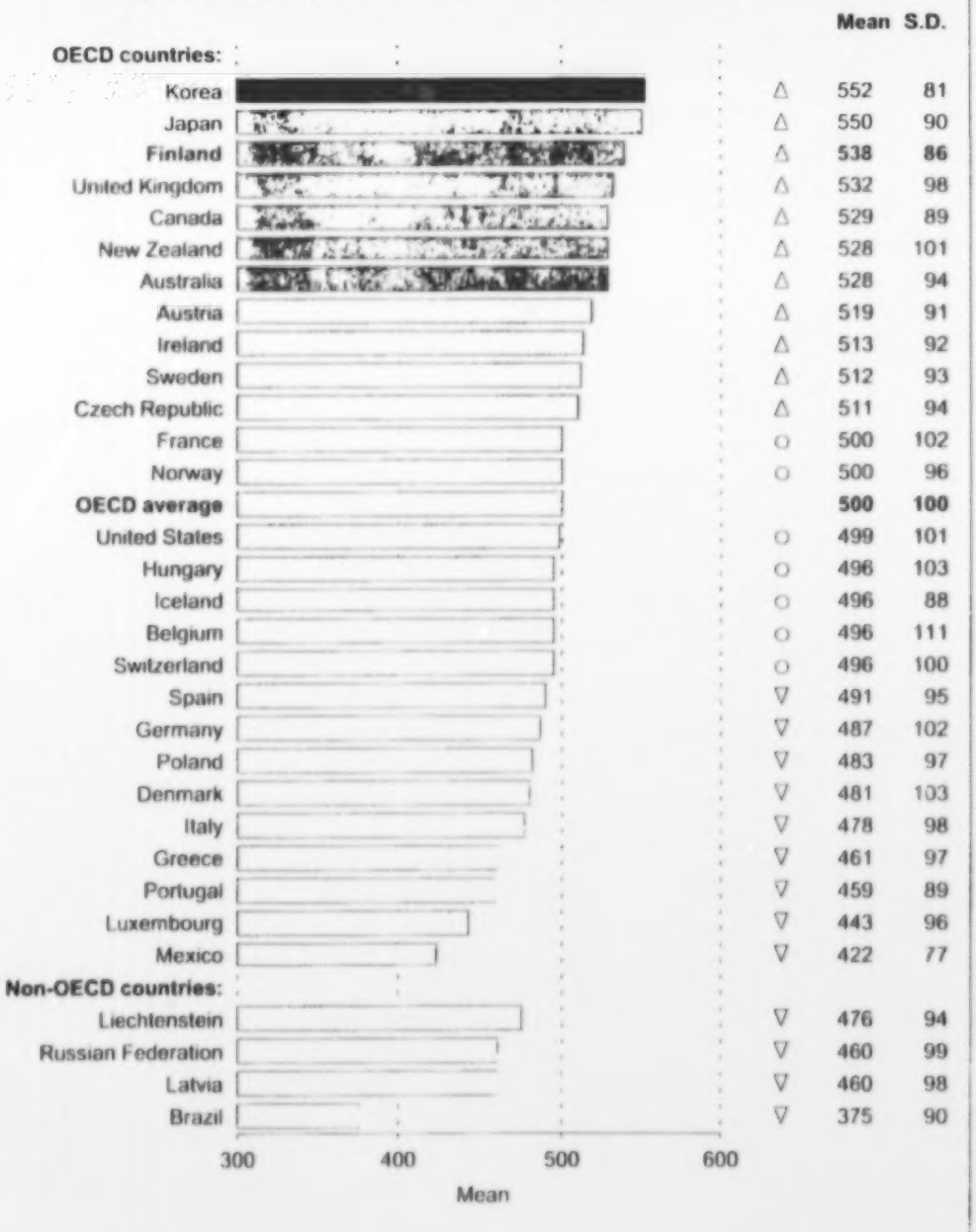
answers were higher in Finland than they were on average across OECD countries. In 11 items, in fact, Finland's proportion of correct answers exceeded that of the OECD average by more than 10 percentage points. Finnish students did especially well in statistics and, more specifically, in interpreting graphs and diagrams. They also outperformed the average of students in the other OECD countries in calculating the areas and perimeters of figures. In algebraic contents, by contrast, Finnish students scored lowest in comparative terms. What was also worrying about the results was that a considerable proportion of Finnish students (21–55 per cent) left a great number of tasks requiring generalisation or explanations unanswered.

Scientific literacy

The tasks used in the PISA assessment of scientific literacy emphasised the student's active role in acquiring information. The student had to recognise and tackle scientific questions, select relevant information from competing data and relate this information to knowledge acquired previously. Based on all this information, the student further had to draw valid conclusions and communicate them to others. The tasks were distributed along three science areas. In both *science in earth and the environment* and *science in life and health*, students had to answer 13 items. In *science in technology*, the number of items was 8. The applications covered by the tasks included, among other things, atmospheric change, biodiversity, chemical and physical change, earth and the universe, ecosystems, energy transfer, genetic control, and human biology.

As revealed by the mean scores in scientific literacy, Finland's performance in scientific literacy proved high quality (Figure 4). The only country outperforming Finland, in fact, was Korea. Japan, the United Kingdom, Canada, New Zealand and Australia, for their part, scored at the same level as Finland. All the other 24 countries had performances significantly lower than that of Finland.

Figure 4 Mean performance in scientific literacy


Mean
S.D.
OECD countries:
Korea Δ 552 81
Japan Δ 550 90
Finland Δ 538 86
United Kingdom Δ 532 98
Canada Δ 529 89
New Zealand Δ 528 101
Australia Δ 528 94
Austria Δ 519 91
Ireland Δ 513 92
Sweden Δ 512 93
Czech Republic Δ 511 94
France O 500 102
Norway O 500 96
OECD average 500 100
United States O 499 101
Hungary O 496 103
Iceland O 496 88
Belgium O 496 111
Switzerland O 496 100
Spain ∇ 491 95
Germany ∇ 487 102
Poland ∇ 483 97
Denmark ∇ 481 103
Italy ∇ 478 98
Greece ∇ 461 97
Portugal ∇ 459 89
Luxembourg ∇ 443 96
Mexico ∇ 422 77
Non-OECD countries:
Liechtenstein ∇ 476 94
Russian Federation ∇ 460 99
Latvia ∇ 460 98
Brazil ∇ 375 90
300
400
500
600
Mean
Statistically significantly above the OECD average
Not statistically significantly different from the OECD average
Statistically significantly below the OECD average
Mean performance statistically significantly higher than in Finland
No statistically significant difference from Finland
Mean performance statistically significantly lower than in Finland

Finland's performance was above the OECD average in all three science areas. This was especially true in *science in life and health,* where Finnish students showed the highest proportion of correct answers among the participating countries. In *science in earth and the environment* and in *science in technology,* Finnish students likewise performed 4 to 5 percentage points above the OECD average.

In Finland, student performance in scientific literacy varied less than in most of the other countries, the standard deviation for student scores being 86 points, the second smallest next to Korea. Korea and Finland thus seem to be the two countries which have best managed to combine high levels of scientific literacy with low disparities in performance. Moreover, as was the case in reading and mathematical literacy, the least proficient Finnish students, in international terms, also did relatively well in scientific literacy. On the other hand, Finnish top performers correspondingly scored clearly lower than their counterparts in Japan, the United Kingdom and New Zealand.

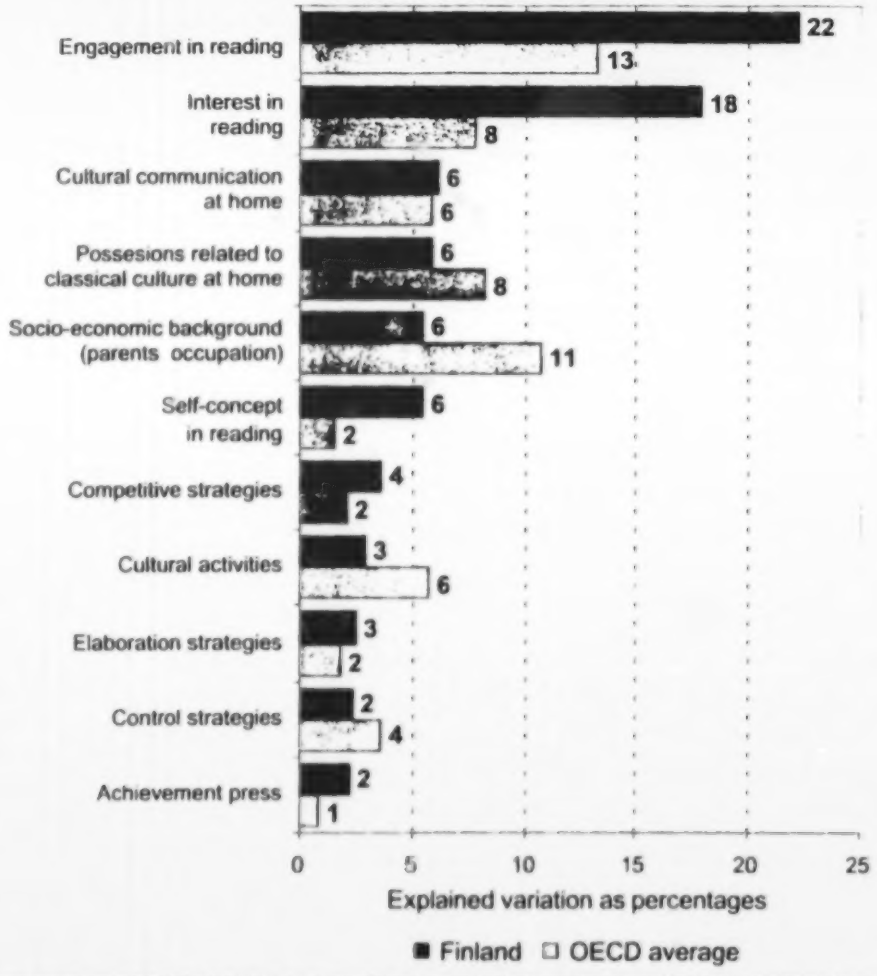
FACTORS BEHIND THE FINNISH SUCCESS IN PISA

Factors associated with Finland's high reading literacy performance

The results of PISA reveal that there is no single factor behind the high reading literacy performance of Finnish students. Rather, Finland's successful performance seems to be attributable to a constellation of interrelated factors. As shown by regression analyses of the PISA data (Figure 5), students' own attitudes and activities, notably engagement in reading (accounting for 22 per cent of the variance) and interest in reading (18 per cent), appear to be the most significant factors explaining variation in reading literacy performance among Finnish students. The next strongest factors have to do with family background – cultural communication between parents and children (6 per cent), possessions related to classical culture at home (6 per cent) and parental occupational status (6 per cent). Students' self-concept in reading likewise accounts for 6 per cent of the reading literacy performance of Finnish students.

Engagement in reading and *interest in reading* thus proved the major single determinants of the reading literacy performance of Finnish students. In

Figure 5 Explained variation in student performance (R^2) in Finland and in OECD countries



Finland, these factors turned out more important than family background, which, for its part, proved more influential in several other OECD countries. This, as suggested by the Finnish PISA team, is an indication that the Finnish comprehensive school has managed to arouse students' interest in reading and, hence, to even out the impact of socio-economic background. The researchers feel that optional subjects combined with a flexible school curriculum play an important role in encouraging students to take up and keep up their own interests, not least as concerns reading.

Among the participating countries, Finnish students displayed the highest level of interest in reading and the third highest level of engagement in reading (Figure 6). In Finland, 41 per cent of students reported reading was one of their favourite hobbies. For girls the figure was 60 per cent and for boys 21 per cent. In a similar vein, in Finland, three out of four students declared they spent some time reading for enjoyment each day; those reporting not reading for enjoyment at all, by contrast, accounted for 22 per cent of the students. On average across OECD countries, the proportion of students not reading for enjoyment was much higher, notably 32 per cent, the highest percentages being found in Japan (55 per cent), Belgium and Germany (42 per cent each). In the other Nordic countries, the proportion of these students not reading beyond school was somewhat higher when compared with Finland: in Denmark it was 27 per cent, in Iceland 30 per cent, in Norway 35 per cent and in Sweden 36 per cent.

Finnish students, together with students from the other Nordic countries, read highly diverse materials. Hence, Finnish students read newspapers, magazines, comic books as well as e-mails and Web pages more frequently than do their fellow students in the other OECD countries on average. Reading fiction and non-fiction, in contrast, remains at or below the OECD average.

Finnish students' engagement in reading is supported by a comprehensive network of libraries, which generally also have separate departments for children and youth. No wonder, Finnish students tend to use libraries more often than students from the other OECD countries (Figure 7). Results show that in Finland 44 per cent of students borrowed books from a library – a school library or a community library – at least once a month, compared to the OECD average of 26 per cent. Girls were clearly more active than boys in borrowing books. In Finland, it is mostly community libraries that are widely used. The use of school libraries, in contrast, remains well below the OECD average. Similarly, due to the comprehensive network of community libraries, Finnish home libraries tend to be only medium-sized by OECD standards.

Figure 6 Engagement in reading

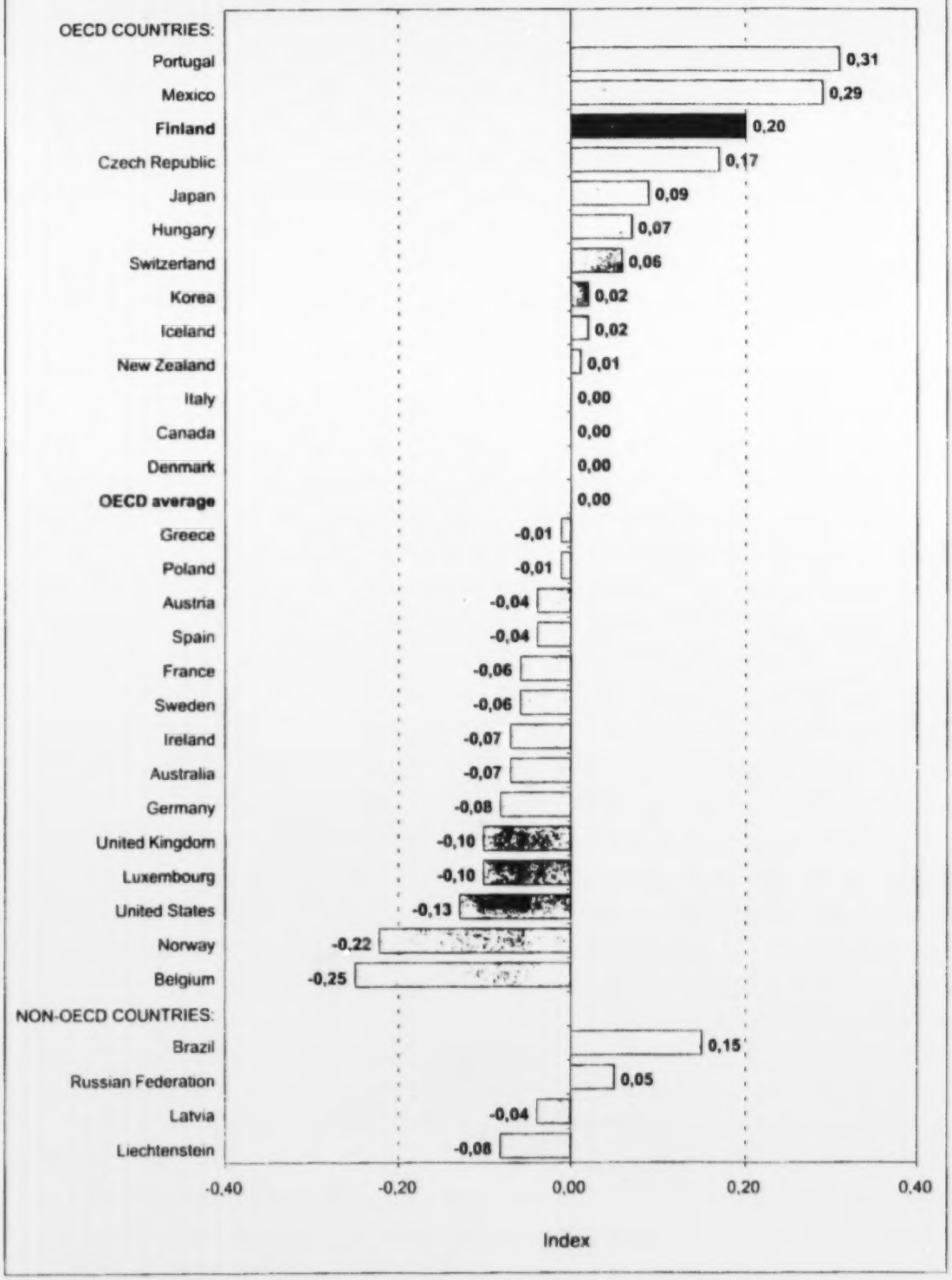


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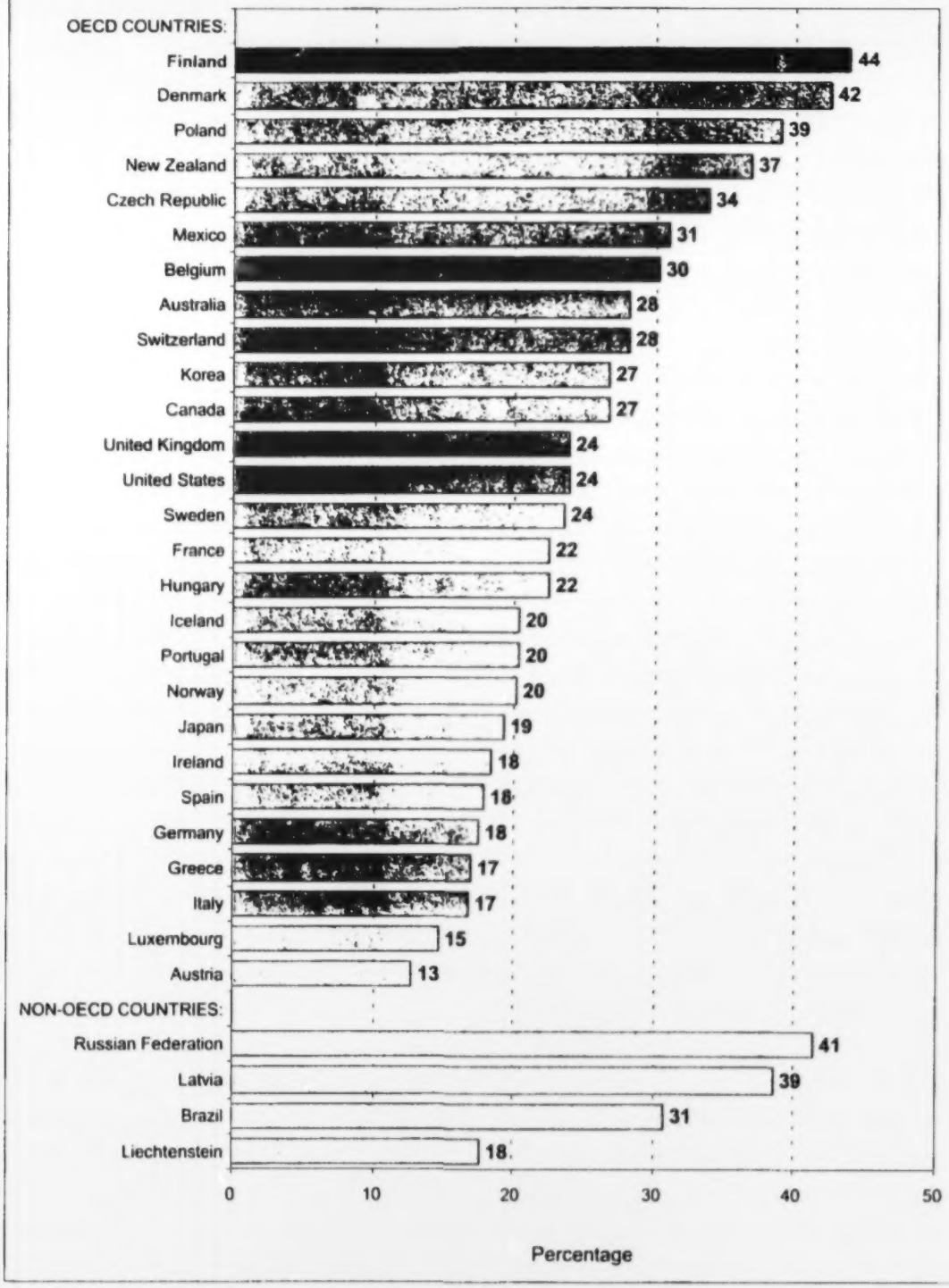
Figure 7 Students borrowing books from a library at least once a month



The national results of PISA show, somewhat surprisingly, that active users of computers are also active readers. They also show that moderate use of computers relates positively to reading literacy performance. Heavy computer users, on the other hand, scored lower in the reading literacy assessment when compared with their more moderate counterparts, whereas those who did not use computers at all proved the poorest readers of all.

Cultural communication explained reading skills to a similar extent in Finland as it did on average across OECD countries. Cultural communication, as defined in PISA, referred to the frequency with which parents interacted with their children in the following areas: discussing political and social issues; discussing books, films and television programmes; and listening to classical music. *Possessions related to classical culture*, by contrast, proved a minor determinant of reading literacy performance in Finland than in the other OECD countries. In PISA, possessions related to classical culture were taken to include classic literature, books of poetry and works of art in students' homes.

Students' own cultural activities turned out a less important determinant of reading skills in Finland than on average across OECD countries. In PISA, these activities covered visiting a museum or art gallery, watching live theatre or attending an opera, ballet, concert or sports event.

Self-concept in reading explained more of the variation in reading literacy performance in Finland than it did on average across OECD countries. Not surprisingly, the higher the self-concept of the Finnish student, the better his or her reading skills. It is to be noted, however, that self-concept in reading did not explain variation in reading literacy performance between countries. A country where students expressed a high self-concept in reading, therefore, did not necessarily rank among the best performing countries. The self-concept of Finnish girls, for instance, lay at the level of the OECD average, while that of Finnish boys even remained significantly below it.

Students' *learning strategies* also have some impact on reading skills both in Finland and in the other OCED countries. In Finland, competitive learning, for example, was found to be most positively related to the reading skills of the best performers. Elaboration strategies, that is, relating new material to prior knowledge and experience and applying it in other contexts, related most positively to the performance of moderate and highly proficient readers. Control strategies or the management of learning, again, tended to be most positively associated with the performance of moderate readers. Achievement press caused by the teacher, in contrast, consistently had a negative impact on the reading literacy performance of both high and low achievers.

Underlying the high quality of the reading literacy skills of Finnish students, there are, apart from the factors dealt with above, a host of home and school environment factors, which were directly addressed in PISA and which will be discussed in later chapters. In addition to these, however, Finland's high reading literacy level may also be presumed to be a function of a great number of factors related to the Finnish education system as well as cultural factors. These will be considered further below.

Factors contributing to Finland's high mathematical and scientific literacy performance

In PISA 2000, the assessment of mathematical and scientific literacy was more restricted and the analysis of the potential factors explaining performance in these domains accordingly more limited than in the case of reading literacy. The data, therefore, do not lend themselves to explaining student performance in these two domains, and the following interpretations also need to be regarded with care. Of the below factors, only the first (self-concept in mathematics) is based on the results of PISA. The other factors are grounded in the long experience and insight of the Finnish PISA researchers.

A high *self-concept in mathematics* was strongly and positively associated with performance in mathematical literacy in all participating countries. Hence, those confident of their mathematical abilities also scored high in mathematical literacy. It has to be noticed, however, that self-concept in mathematics did not explain variation in mathematical literacy performance between countries. A country where students displayed a low self-concept in mathematics, thus, did not necessarily rank among the lowest performing countries. Korea, as an example, where students expressed the lowest self-concept in mathematics, was one of the top performing countries in mathematics. The self-concept of Finnish students, again, was slightly above the OECD average. Interestingly enough, Finnish students also tended to be much more confident of their mathematical abilities than of their reading skills, even though in international terms, they performed lower in mathematical literacy than in reading literacy. In all PISA countries, including Finland, boys displayed a higher self-concept in mathematics than girls. In Finland, however, there were no differences between the genders in mathematics performance.

Finland's high performance in the PISA assessment of mathematical and scientific literacy may further be explained by the fact that *the tasks* used in PISA were *well suited to the Finnish curriculum.* In mathematical literacy, for instance, the tasks placed great emphasis on the use and application of knowledge, which together with problem solving have played a central part in Finnish mathematics instruction. Similarly, in the assessment of scientific literacy, stress was laid on experimental thinking and the student's active role in acquiring information, which have also been key concepts in the Core Curriculum for the Finnish Comprehensive School. The same holds true for students' environmental awareness and knowledge of the principles of sustainable development: these were accentuated in PISA and, likewise, form an integral part of the Finnish core curriculum. One more factor which may have been conducive to Finland's high performance – and to that of other countries – is the fact that three-fourths of the tasks used in PISA were taken from the life and earth sciences (biology and geography), while the rest concerned the experimental sciences (physical science).

The proportion of time devoted to these two areas in science instruction varies between countries and may be assumed to have had an impact on the results. At Finnish comprehensive schools, three-fourths of science instruction time is spent on biology, geography and environmental education and the remaining one-fourth on physics and chemistry.

While it is true that Finland ranked third in the PISA assessment of scientific literacy, Finnish top performers nevertheless scored clearly lower than those in, for example, Korea, the United Kingdom, New Zealand and Japan. This may be accounted for, among other things, the fact that in these countries the majority of students already took part in general or vocational upper secondary programmes or work-based education programmes, where science plays a more important role than at the Finnish comprehensive school; all Finnish students, by contrast, still participated in compulsory basic education.

A final factor undoubtedly contributing to Finland's high performance in mathematical and scientific literacy is the national LUMA programme. The programme, launched in 1996, aims at developing knowledge and skills in mathematics and science at all levels of schooling (LUMA is an acronym for the Finnish *luonnontieteet* ja *matematiikka*, 'science and mathematics'). Great effort has accordingly been put in the programme in, for instance, the following: updating computer hardware and software as well as science laboratory equipment and material at schools; enhancing teacher training as concerns both subject and pedagogical studies; and increasing experimental activities. Even though it is not possible to establish numerically a causal link between the LUMA programme and Finland's mathematics and science performance in PISA, the programme has undeniably opened new educational opportunities and, above all, aroused new faith in and enthusiasm for the development of Finnish mathematics and science instruction.

High equality of educational outcomes

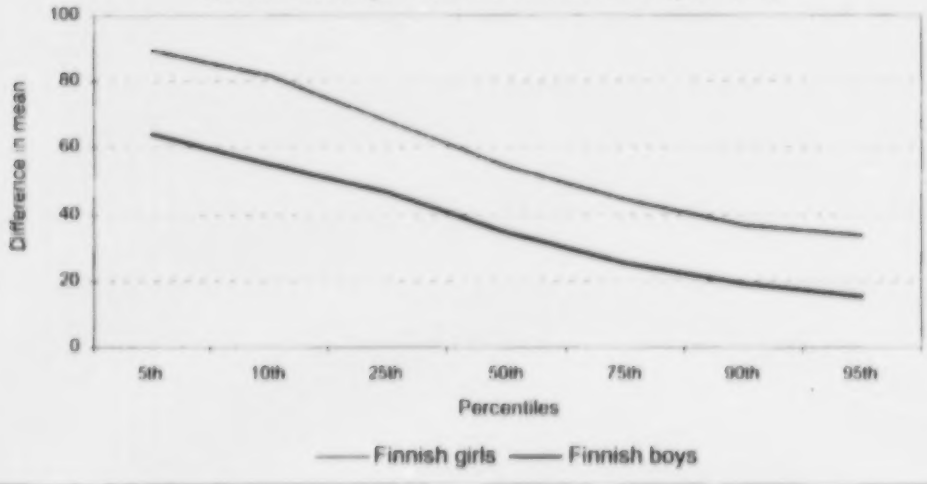
Equality in student achievement

Attaining high overall performance while, at the same time, evening out disparities in performance is one of the key aims of national education policy in most OECD countries. In Finland and in the other Nordic countries, this thinking has a long tradition. Providing all students with equal educational opportunities and removing obstacles to learning especially among the least successful students have been leading principles in Finnish education policy since the 20th century. In the light of PISA findings, Finland seems to have managed extraordinarily well in combining these two principles.

The Finnish strategy for building up high quality has been based on the principle of equity and on an effort to minimise low achievement. One of the most interesting findings of PISA, therefore, has to do with the fact that in Finland the gap between high and low performers is relatively narrow. In reading literacy, for example, the standard deviation for student scores proved the second smallest and the difference between students with the highest and lowest performance among the least important in the OECD. Indeed, the Finnish performance profile seems to be characterised by the lowest scoring students, in particular, showing a different pattern of performance from that of their fellow students in the other OECD countries (Figure 8). The difference between Finnish top performers and the OECD average, on the other hand, tends to be much less pronounced, albeit clear.

Figure 8 compares the reading literacy performance of Finnish girls and boys with that of the average of girls and boys in the combined OECD area respectively, the OECD averages set at 0. As shown by the figure, Finnish girls did extremely well when compared with girls in the OECD, the gap being especially marked at the bottom end. Finnish boys likewise performed well in international terms, yet the difference was consistently

Figure 8 Finnish girls and boys, compared to girls and boys in the combined OECD area, performing at the different percentiles on the combined reading literacy scale (OECD averages standardised to be equal to 0)



smaller than in the case of girls. A comparison of, for example, the reading proficiency level attained by the weakest 10 per cent (10th percentile) of students reveals that Finnish girls outscored their counterparts in the combined OECD area by 82 points. Finnish boys also did better than their fellows in the OECD; this time, however, the difference was considerably smaller, notably 55 points. As regards the best students, that is, those scoring above the point reached by 10 per cent (90th percentile) of students, Finnish girls outperformed their fellow students in the OECD by 37 points. The highest performing (90th percentile) Finnish boys, on the other hand, outscored the average of boys in the OECD by a mere 19 points.

Figure 8 thus aptly illustrates the realisation of the aim of equality at the Finnish comprehensive school. As shown by the figure, the difference in favour of Finland is the bigger, the lower the reading literacy performance of students. Towards the other end of the scale, the difference gets smaller; yet, especially for girls, it remains substantial even in the case of top performers. It is noteworthy that this high proficiency of the least successful students is also a major determinant of Finland's high average reading literacy performance.

The above trends further apply in large measure to mathematical and scientific literacy, where it was, again, especially the lowest scoring Finnish students that differed from their fellow students in the other OECD countries; moreover, the relative superiority of Finnish girls over Finnish boys was as evident in these subjects as it was in reading literacy. In mathematical literacy, in fact, the difference between the best performing Finnish boys (90th percentile) and their counterparts in the combined OECD area was almost non-existent; in the 95th percentile, as an example, Finnish boys outscored the average of boys in the OCED by a mere 4 points. For girls the corresponding difference was 21 points in favour of Finnish girls.

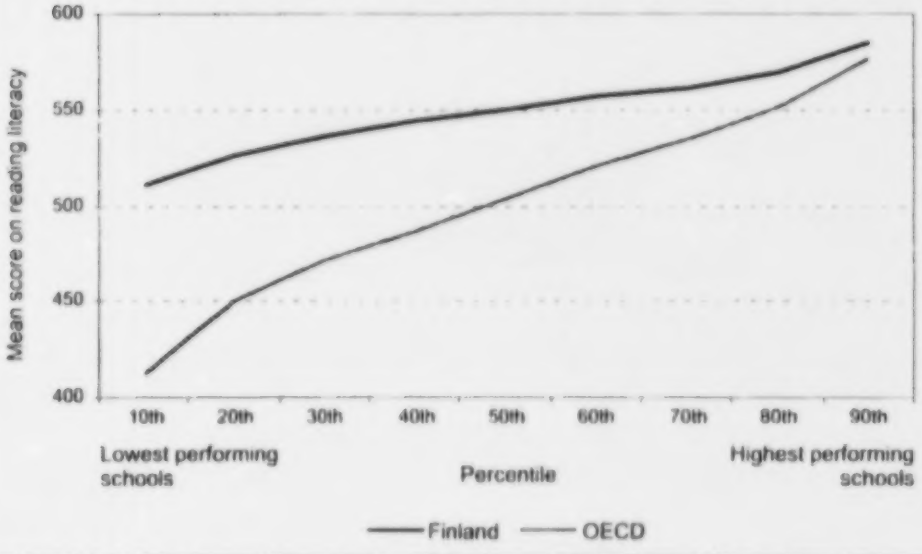
Equal opportunities to learn

As a token of equal educational opportunities, the differences found between schools in Finland proved among the smallest in the OECD. While these differences accounted, on average, for 36 per cent of the variation in students' reading literacy performance in OECD countries, in Finland only 5 per cent of the variation was between schools.

Small between-school variation is a characteristic of all the Nordic countries. This is largely due to the fact that these countries have non-selective education systems where all students are provided with the same kind of comprehensive schooling. In contrast, variation between schools tends to be more pronounced in countries where students are enrolled into different kinds of schools at an early age. Results show that small between-school variation is a key predictor of high student performance. Countries with the highest performance in reading literacy usually display comparatively small differences between schools.

In the light of PISA findings, the Finnish comprehensive school system stands out as exceptional in that in Finland even the least successful schools attain a relatively high level of reading literacy when compared with the other OCED countries (Figure 9). In Finland, the point below

Figure 9 Percentiles of schools on the combined reading literacy scale



which the lowest performing 10 per cent (10th percentile) of schools scored was almost 100 points above the OECD average. The same trend applies to the highest performing schools (90th percentile), even though the difference, in this case, was only 10 points. The high overall performance of the Finnish comprehensive school is further evidenced by the fact that of the Finnish schools taking part in PISA only seven (4.5 per cent) scored below the OECD average (500 points). In this respect, the high quality and equality of Finnish schools proved quite unique when compared to any other OECD country.

From the viewpoint of the goals set for the Finnish comprehensive school, however, the differences found between Finnish schools are not without significance. Even in Finland, the best 10 per cent of schools scored, on average, 97 points higher in reading literacy than the poorest 10 per cent of schools. On the PISA scale of reading literacy, consisting of five proficiency levels, this represents a difference of one and a half proficiency levels. This poses a true challenge to the development of the Finnish comprehensive school. The challenge is made no less important by the fact that in OECD countries the difference between the two extreme groups was 204 points.

Finland has sought to provide all students irrespective of their place of residence with equal opportunities for high quality education. An extensive network of schools and the recruitment of highly qualified teachers in all schools have been important means in ensuring high educational quality and equality in all Finland. The results are most encouraging, which can be seen in that in PISA the differences found among schools between the different regions as well as the urban and rural areas of Finland proved relatively unimportant. In Finland it is thus of little consequence where students live and which school they go to. The opportunities to learn are virtually the same all over the country.

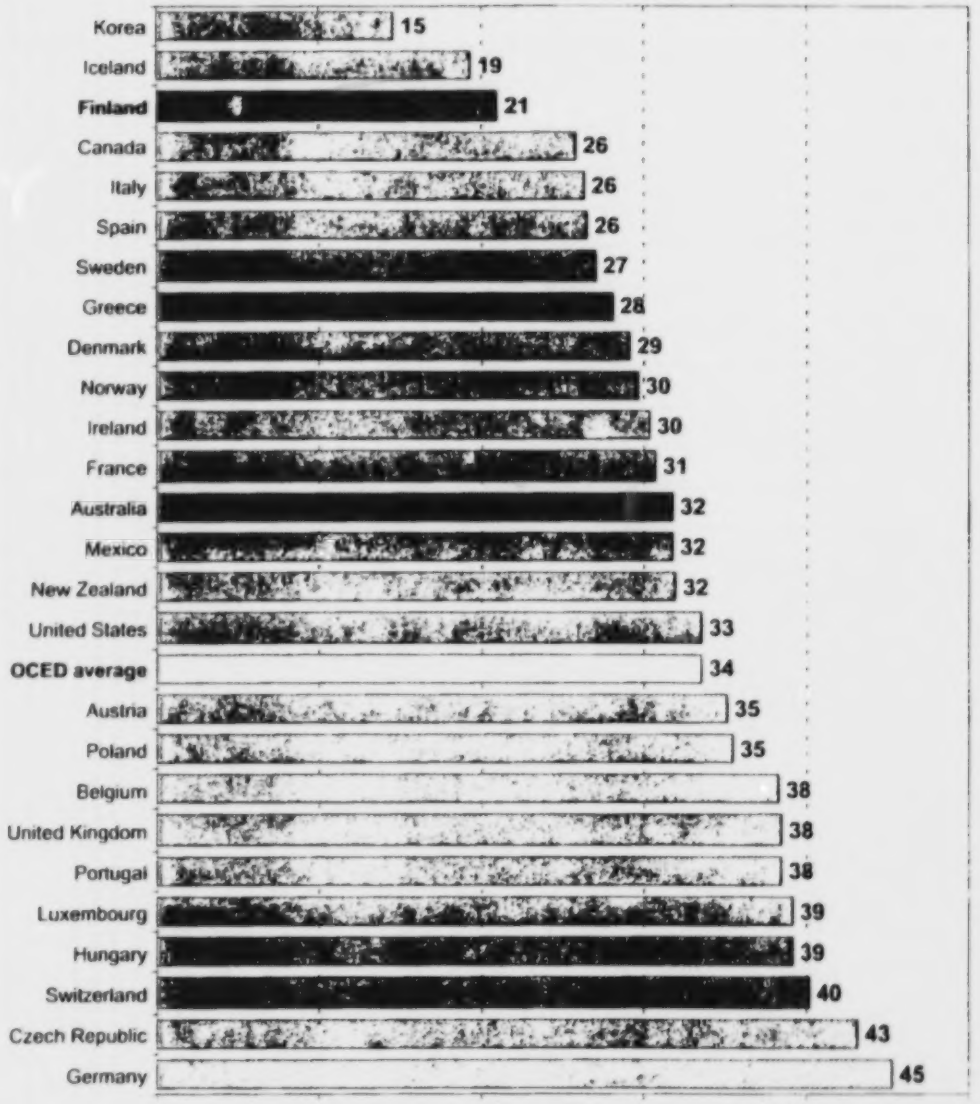
Equality related to family background

Students come to school from widely differing family backgrounds both in Finland and in the other PISA countries. Family background, as shown by the results of PISA, still has an impact on student performance. In Finland, however, this influence is less marked than on average across OECD countries.

Of the factors related to family background, *the socio-economic background of students,* measured as parental occupational status, was the one most strongly associated with reading literacy performance in all participating countries. Students whose parents had the highest status jobs significantly outperformed those with lower socio-economic backgrounds. This was especially the case in, for instance, German and some other Central European countries. The difference was considerable in Finland as well, yet remained clearly below the OECD average (Figure 10). In Finland, even students whose parents belonged to the lowest socio-economic quarter performed above the OECD average.

In the participating countries, the impact of *parental education* and *family wealth* on reading literacy performance proved less pronounced than that of parental occupational status and varied across the countries. In Finland,

Figure 10 Change in the combined reading literacy score per standard deviation of the international socio-economic index of occupational status



these factors had a lesser impact on reading literacy than in most of the other countries.

The cultural background of the family also exerts considerable influence on reading literacy skills in both Finland and the other PISA countries. In Finland, cultural communication accounted for as much of student performance as it did on average across OECD countries. Possessions related to classical culture and participation in cultural activities, by contrast, explained reading literacy performance to a lesser extent in Finland as compared to the OECD average.

Challenges to educational equality

The findings of PISA show that some countries have managed to achieve both high average quality and high equality of educational outcomes. This in itself is encouraging in that it implies that inequalities in educational outcomes can be reduced. Finland, for example, has been successful in ensuring small disparities between schools. Parental socio-economic status also has a less significant impact on student performance in Finland than in most of the other PISA countries.

On the other hand, Finland has been less successful in ensuring gender equality, particularly as concerns *reading literacy*. As shown by PISA results, girls outperformed boys in reading literacy in all the 32 participating countries. In Finland, however, the gender gap was widest and proved significant on all three subscales of reading literacy. The gap, nevertheless, is not due to Finnish boys doing poorly but rather to Finnish girls performing exceptionally well. After all, Finnish boys scored better than boys in any other OECD country and even better than girls in many of the participating countries. The gender differences notwithstanding, the Finnish PISA team is confident that the gap can be reduced without lowering the average level of performance, especially by fostering boys' interest and engagement in reading both at and outside school.

"Welcome to our school!"

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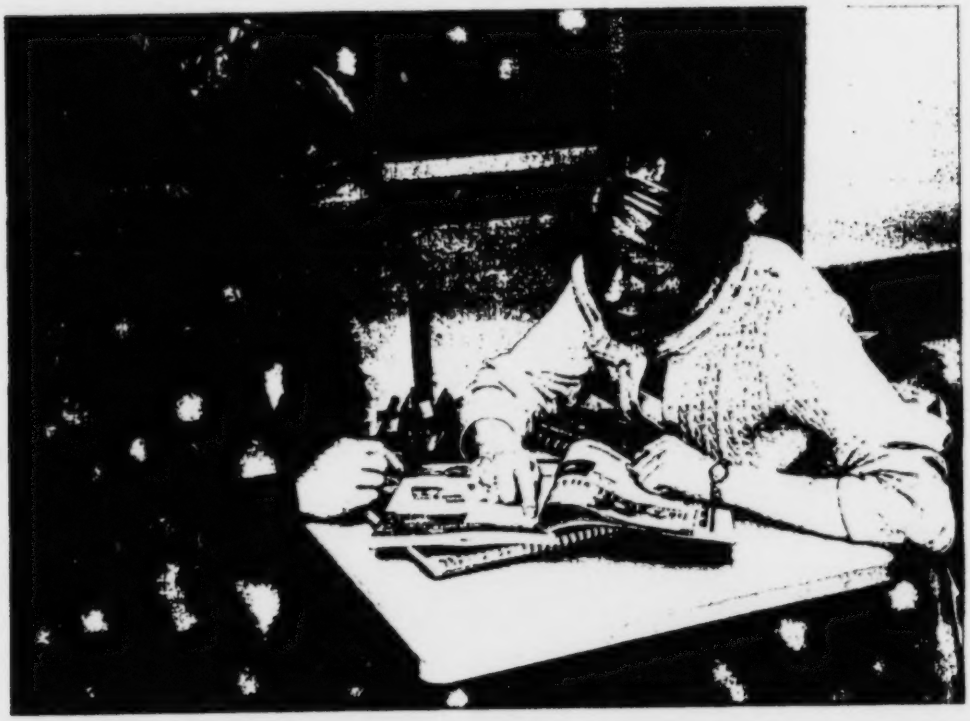
"We like working in projects."



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"The student counsellor is there to help us plan our studies."

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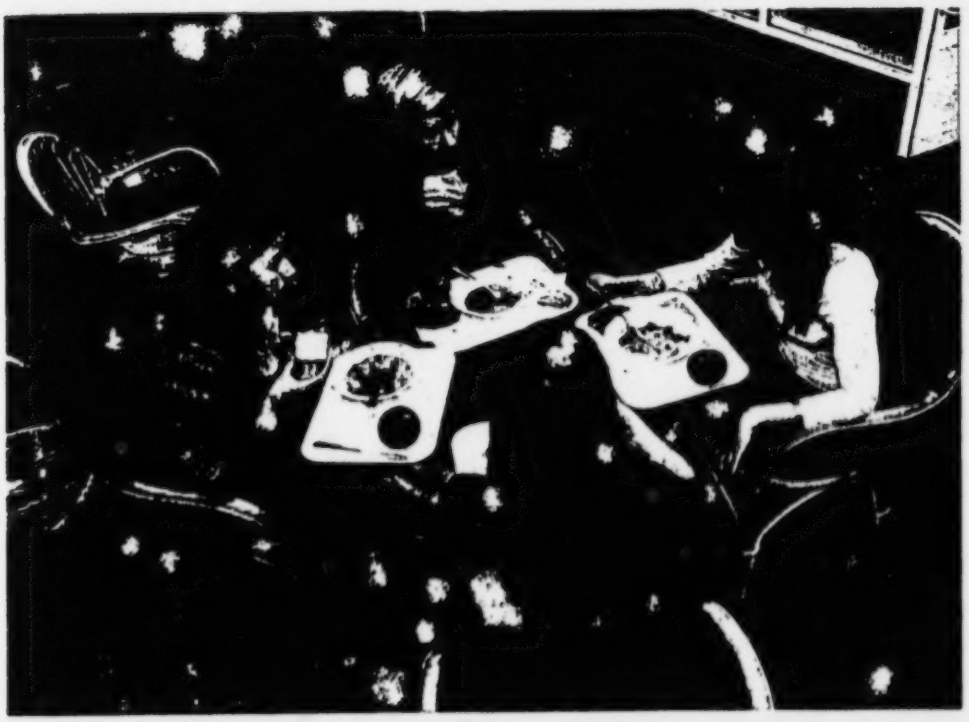
"The lunch hour is the highlight of the school day."



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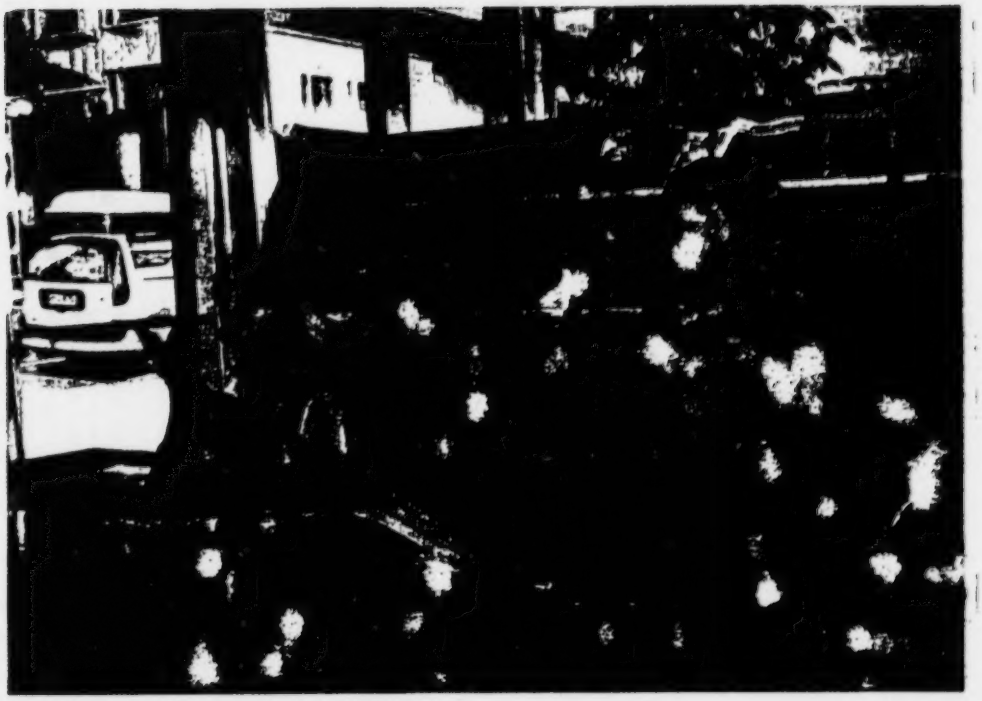
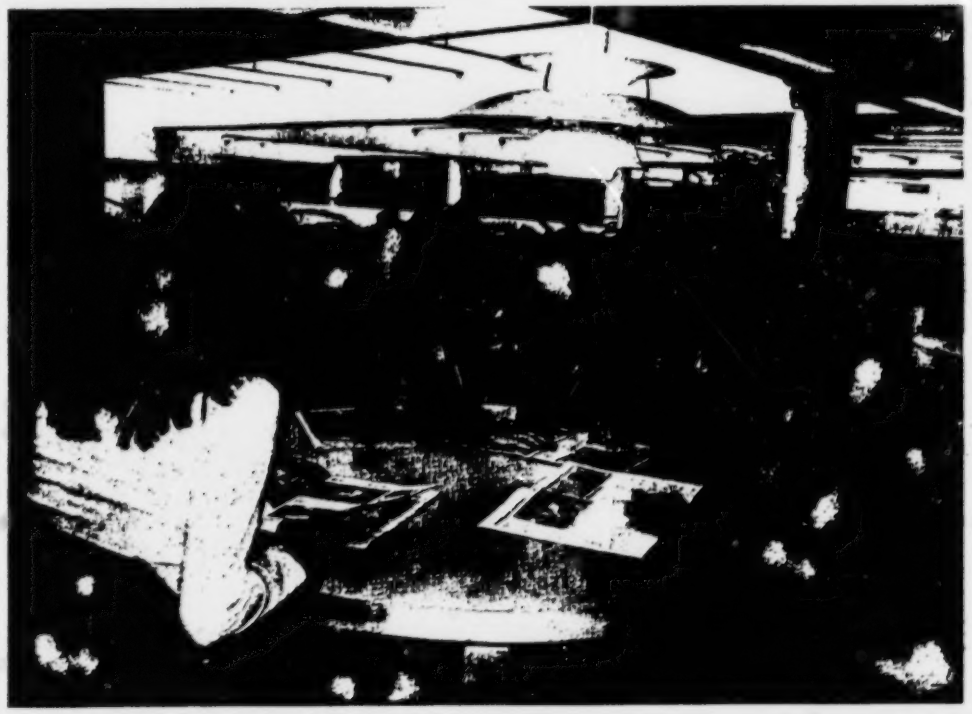


"Newspapers are our favourites."



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"Thanks to libraries, there are al

here are always lots of books around."

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"Library databases come in handy when we gather information for our school assignments."

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In *mathematical literacy*, on average across countries, gender differences were considerably smaller than in reading literacy. In Finland, practically no differences were found between boys and girls in this domain (the difference in mean performance being 1 point in favour of boys). This high equality between the genders can further be seen in that in mathematical literacy, roughly the same proportions of Finnish boys and girls scored at the low, middle and top levels of performance. In almost all the other participating countries, boys outperformed girls in mathematics, even though the differences were, for the most part, relatively small.

In *scientific literacy*, Finland displayed no significant gender differences. Finnish girls and boys, however, performed well in different aspects of scientific literacy. Girls outperformed boys when it came to the social aspects and ethics of science, while the reverse was true for technological applications of science.

Educational environment

Judging from the PISA data, Finnish students seem to show a great number of special characteristics related to attitudes, values and out-of-school activities that support high quality learning, especially as regards the development of reading skills. The above, however, constitute only one, albeit important, part of the network of factors that help to explain Finland's high performance in PISA.

A philosophy that works

The Finnish comprehensive school is not only a system (see Appendix 1). It is also a matter of pedagogical philosophy and practice. An intrinsic part of this philosophy is the principle of equity, on which Finnish education policy has been largely premised. Efforts have accordingly been made to provide all population groups and regions of the country with equal educational opportunities.

At the system level, this philosophy is reflected in the extensive network of educational institutions covering the entire country. There are, in fact, over 4,000 comprehensive schools, some 750 upper secondary schools (academic and vocational), 20 universities and a great number of other educational institutions in Finland – and only slightly over 5 million inhabitants.

Education has also been an integral part of Finnish national programmes aiming at cultural development. In a small and remote country with a strange language, the provision of education for all has been conceived as a necessary means for keeping the nation's culture dynamic. A small country, it has been thought, cannot afford to leave any one outside high quality education. This became especially evident during the recession years of the 1990s, which greatly strengthened faith in the significance of education, not least as concerns employment opportunities and economic success.

The Finnish comprehensive school is for each child and, hence, has to adjust to the needs of each child. Instruction and pedagogy at Finnish schools have accordingly been structured so as to fit heterogeneous student groups; Finnish teachers know, for example, that no student can be excluded and sent to another school. In line with this principle, students' own interests and choices are likewise taken into account at schools when planning the curriculum and selecting contents, textbooks, learning strategies, methods and assessment devices. All this calls for a flexible, school-based and teacher-planned curriculum along with student-centred instruction, counselling, and remedial teaching.

Supporting individual students

How is it possible to teach entire age cohorts in heterogeneous groups? An important part of the explanation lies in the fact that comprehensive school pedagogy differs considerably from the pedagogy applied in parallel systems, characterised by explicit tracking and streaming. Heterogeneous groups, for instance, necessitate highly educated teachers, genuine experts in pedagogy.

This is largely because in comprehensive systems, the task of the teacher consists in taking care of every single student and allowing, in everyday school work, for a diverse student body. Heterogeneous grouping, as shown by studies conducted in the 1970s and 1980s, when the Finnish comprehensive school was still under construction, and confirmed by the PISA data, appears to be of the greatest benefit to the weakest students; the performance of the best students, in contrast, seems to remain virtually the same irrespective of how the groups are formed.

Special education has likewise played an important role in Finnish schools in catering for students who have problems following regular teaching. Special education is usually closely integrated into normal teaching and is highly inclusive by nature. Indeed, only about two per cent of students attend separate special education institutions. In practice, a student with problems in a certain subject or subjects typically has the opportunity of studying once or twice a week in a small group of 2–5 students or even individually with a special teacher. The special teacher may, alternatively, also attend regular classes. On the primary level (grades 1 to 6), where class teachers have the main responsibility for instruction, special education mostly centres on reading and writing skills along with mathematics skills. On the lower secondary level, foreign languages likewise cause difficulties to a number of students. A student's right to special education is stipulated in the Finnish school laws.

Every student also has a right to student counselling. Schools are to provide students with guidance in study skills, choice of options (e.g. elective courses) and planning of post-compulsory studies. At grade levels 7 to 9, every school has a student counsellor, who provides individual guidance to those in need or desirous of it.

Teaching a heterogeneous student body further presupposes efficient small teaching groups and readiness on the part of the school to reorganise groups if necessary. The results of PISA show that in Finland the average number of students in study groups is among the smallest in the OECD. Nonetheless,

Finnish teachers are constantly worried about what they consider too large group sizes, finding it demanding to look after the individual needs of different students.

Highly qualified teachers are a necessity

In Finnish culture, the profession of teacher has been seen as one of the most important professions of society, and a lot of resources have consequently been invested in teacher education. Teachers have also been trusted to do their best as true professionals of education. From this it has followed that Finnish teachers have been entrusted with considerable pedagogical independency in the classroom and that schools have likewise enjoyed substantial autonomy in organising their work within the limits of the national core curriculum.

In order to cope with a heterogeneous group, a teacher has to be highly educated, a pedagogical expert (see Appendix 2). This is what Finnish teachers are. All Finnish teachers, to start with, have to complete a master's degree either in education or in one or two teaching subjects. Additionally, the teacher's profession, especially that of the class teacher, is greatly valued and popular among Finnish post-secondary students. This can be seen from, for example, the popularity of the class teacher's programme provided at universities. Of all the applicants for this programme, only 10 per cent are admitted, which implies that those accepted are highly motivated and multi-talented students with excellent academic skills. Educating class teachers at universities and the scope and depth of their study programme seem to be the factors that make Finnish teacher education stand out as special, when compared to other countries. These factors further mean that young Finnish teachers, in particular, are well acquainted not only with various teaching methods but also with educational research; many of them, moreover, appear to be well prepared and motivated to develop their professional skills through further education and training.

As revealed by certain comparative studies, Finnish teachers also appear to set high standards for students' literacy skills and interests. Even on the primary level, teachers stress the importance of demanding cognitive aims. In the context of the IEA study of reading literacy conducted in 1991, for instance, an international option was carried out in 11 countries, where teacher expectations of reading achievement were estimated by a panel representing various occupational groups as well as upper secondary school teachers and counsellors. The results of the study showed that teachers in the Nordic countries, particularly in Finland and Sweden, had extremely high expectations of the reading skills of their students. The countries with the highest expectations also performed highest in the reading literacy test.

Regarded as educational experts, Finnish teachers are, finally, relied on when it comes to student assessment, which usually draws on students' class work, projects, teacher-made exams and portfolios. In Finland, the role of teacher-based assessment is all the more important because at Finnish comprehensive schools students are not assessed by any national tests or examinations upon completing school or during the school years.

Curricular flexibility and pedagogical freedom

Until the 1990s, the Finnish national core curriculum used to be strict and detailed – the structure, organisation, content, resources and methods of the comprehensive school all established in the curriculum – and textbooks meticulously controlled, the goal being high educational consistency across schools and classrooms. A profound change in curricular philosophy and practice, however, took place in the early 1990s. The national curriculum underwent reorganisation, whereby it became more flexible, decentralised and less detailed. At the same time, questions about the accountability of schools as well as the need for national testing programmes and national grading guidelines gained momentum also in Finland. Today, Finland has national grading guidelines for performance regarded as good (8 on a numerical scale ranging from 4 to 10). These guidelines, however, are far

from strict, allowing students' effort and activity to be taken into consideration.

The outcomes of the whole Finnish nine-year comprehensive school are followed by sample-based surveys. Yet, these too are only published on the system level, while the results of individual schools are, in like manner, delivered exclusively to the schools concerned. Finnish schools indeed still have a high degree of autonomy in pedagogical and curricular practices.

This is further confirmed by the findings of PISA, which reveal that Finnish teachers are vested with a considerable degree of decision-making authority as concerns school policy and management. Finnish teachers, as an example, have almost exclusive responsibility for the choice of textbooks. They also have more say than their colleagues in the OCED in determining course content, establishing student assessment policies, deciding which courses the school should offer and allocating budgets within the school. Governing bodies of schools and local educational authorities, by contrast, have less decision-making power in Finland than in the other OECD countries. As a rule, in PISA, countries with greater degrees of school autonomy, including Finland, attained higher average levels of student performance than those with lower levels of school autonomy. A high degree of school and teacher autonomy in decision-making may thus be assumed to have been one decisive factor contributing to Finland's high performance in PISA.

Paradoxically, shortly after the international publication of the first PISA results, the Finnish government made a decision to harmonise the education system by adding to the share of compulsory studies at comprehensive schools and by giving more weight to core subjects. The potential threat of growing differences between schools and the increasing number of Finnish students falling short in reading literacy and mathematics were the main arguments for the decision. Assessment results and political decision-making on education do not always go hand in hand.

Cultural homogeneity

In the long term, the development of the Finnish comprehensive school has been underpinned by an exceptionally broad cultural and political consensus about the main lines of national education policy. In Finnish culture, grave political conflicts and sudden changes in educational thinking have been relatively rare. Throughout the 20th century, for instance, educational services were developed evenly and in agreement with the needs of different population groups and regions. Today – largely thanks to the high quality of Finnish teacher training – high-grade education is provided at every school. This, again, is reflected in Finland's below average variation in educational outcomes at both the individual and system level.

Owing to cultural homogeneity, it has been comparatively easy in Finland to reach mutual understanding on national education policy and the means for developing the education system. Even the comprehensive school reform of the 1970s was introduced without huge political contradictions. There was, in fact, a broad national consensus in the 1960s and 1970s that the parallel system should be replaced by a more equal comprehensive school system. To date, education has thus seldom been a subject of major political or social controversies in Finland. Suspicions have, admittedly, been voiced that comprehensive school education evens out and, hence, lowers the level of performance, especially as far as the gifted are concerned. A few years ago, it was further suggested that university-level teacher education be abandoned and resubstituted by college-level teacher training. These discussions, however, never gained wide currency. Today, the situation appears to be changing. This is evident from the lively debate sparked off by the results of PISA in Finland, particularly when compared to results of some national assessments, displaying various defects in the knowledge and skills of Finnish students as well as growing differences between schools. All this seems to imply that in the years to come, finding common values and a political consensus about central educational issues may be getting more difficult also in Finland.

As a culturally homogeneous country, Finland has further been exemplary in taking care of its minorities. In Finland there are two official languages, Finnish (94 per cent of the inhabitants) and Swedish (6 per cent). Both of these language groups are equally entitled to and have equal resources for education in their own language from the pre-primary level up to the university level. Other minorities in Finland, however, are relatively small. In the PISA data, for example, non-native students accounted for a mere 1.0 per cent (the OECD average being 4.7 per cent) and those not speaking the language of assessment for 1.3 per cent of all Finnish students (compared to the OECD average of 5.5 per cent). With the prospective increase in the number of these students, Finland too may be expected to be faced with entirely new educational challenges.

* * *

All in all, the results of PISA suggest that there is no single key factor behind Finland's successful performance in PISA. Rather, Finland's high achievement seems to be attributable to a whole network of interrelated factors, in which students' own areas of interest and leisure activities, the learning opportunities provided by schools, parental support and involvement as well as the social and cultural context of learning and of the entire education system combine with each other. The above factors aside, mention should also be made of certain basic services that are well tended by the Finnish comprehensive school, such as offering free warm meals and school health services to all students and providing social, psychological and pedagogical support to students with special needs. All these factors help to even out variation in learning outcomes among students with divergent family backgrounds and individual skills. Moreover, the extensive network of libraries, the prestige of literary culture and education, high teacher expectations, pedagogical experimentation and recent reading campaigns aimed at fostering students' engagement in reading can all be assumed to have contributed to Finland's high performance, especially as concerns reading literacy, even though establishing a causal statistic relationship between these factors and educational outcomes is difficult.

CHALLENGES TO THE FINNISH COMPREHENSIVE SCHOOL

The Finnish comprehensive school seems to be successful in providing the majority of its students with a solid foundation for further schooling, for transition to working life and for full participation in modern society. The results also predict an auspicious future for the whole nation, whose cultural originality, economic success and social equity are all premised on the performance and thirst for learning of every citizen.

Taken together, the Finnish PISA findings further show that an education system can succeed in combining high quality performance with high equality. The pursuit of equality, however, will also have to be a leading principle in the future development of the Finnish comprehensive school. The depth of the Finnish tradition of equality, in fact, will shortly be put to a severe test owing to the increasing numbers of immigrant students and growing cultural heterogeneity. To tackle this problem of equality, Finland will understandably have a lot to learn from countries which, unlike Finland, have had ample experience in immigration both in the past and in the present.

Even though the performance of Finnish students, in the light of PISA, proved excellent, there is still room for improvement. Yet, these improvements presuppose increasingly allowing for the individual needs of students. In PISA, for example, 14 per cent of Finnish students were found to have some and a further 7 per cent severe difficulties in coping with the literacy demands of today's knowledge society. By international standards, the proportion is small, yet from the Finnish point of view, it is far too high. The Finnish comprehensive school will therefore have to continue struggling to decrease, or preferably to dispose of altogether, the proportion of these students at risk.

Gifted education pedagogy has traditionally got meagre attention in Finland and has often been mistaken for an alternative to the concern shown for the least successful students. Yet, it seems that even the development of students with widely differing knowledge and skills can be appropriately strengthened in heterogeneous groups as long as the teacher is capable enough and has sufficient resources for within-group differentiation. This, however, appears to be jeopardised in today's Finland by the increase in the average teaching group size, brought about by economic retrenchment. Moreover, as another step towards developing the education of the gifted, national education policy should advance a pedagogy that pays greater attention to individuality, self-esteem and self-regulation instead of exclusively emphasising the importance of common core skills. This, again, might further strengthen students' ability to reflect on and critically evaluate the information they receive.

In PISA, Finnish students' and especially principals' perceptions of school climate proved, on average, much more negative than those of their fellows in the OECD. This is significant in that school climate and satisfaction are known to influence students' motivation for and attitude to learning and, in turn, the development of knowledge and skills essential in post-compulsory studies and lifelong learning. School principals, in particular, would therefore be expected to be more confident of their possibilities of stimulating in teachers and students alike a desire to improve the well-being of their

own schools and to work for a peaceful and innovative learning environment. True, the Finnish comprehensive school does face a host of problems caused not only by social development but also by a change in students' values and behaviour patterns. These, however, remain within reasonable limits and should not mask the fact that, on the whole, the Finnish comprehensive school rests on a solid basis and exhibits high quality performance.

From a pedagogical viewpoint, Finland's greatest challenge as regards reading literacy appears to be concerned with the wide performance gap between boys and girls, brought about, among other things, by gender differences in values, goals and out-of-school activities. To reduce the gender gap, innovations that seek to stimulate interest and engagement among boys in literary culture and that help them to find enjoyment in reading are thus badly needed. To this end, information networks, as an example, which largely rest on the ability to read, might be taken fuller advantage of. Apart form the above, gender differences in performance further relate to differences in psychological and socio-cultural constructs, which can be seen, among other things, from the wide variation found between Finnish girls and boys in self-confidence as concerns both mathematics and reading. Of these two domains, mathematical literacy is still felt to be a definitely male domain, while reading literacy is thought of as a female one. An intriguing question calling for further exploration, then, is why this difference is no more reflected in mathematics performance, whereas in reading literacy it has led to an ever widening gender gap in performance.

Another pedagogically interesting finding relates to the Finnish tendency of using school homework as a tool for controlling student involvement, whereas in numerous other countries homework mainly aims at actively supporting class interaction. This difference is primarily seen in that in Finland, students' homework is assessed, is given feedback on and impinges on marks much less frequently than on average across OECD countries. Homework thus appears to be one area where Finnish pedagogy would greatly benefit from the experience of other countries. This is especially true in the case of high performers, who spend little time on homework and

who would therefore be expected to find more challenging tasks, research projects as well as reflective and argumentative writing profitable.

In Finland, students' learning strategies showed a fair relationship with performance. High performance was accordingly associated with students' above average awareness of their own learning strategies and their ability to control the learning process. In today's world leaning on dynamic and networked knowledge, this ability is gaining ever greater momentum. Learning strategies also constitute an integral part of lifelong learning skills. Understandably then, the development of effective learning strategies – identifying, consciously developing and monitoring the efficiency of these strategies in the various content areas of the school – will continue to be one of the major pedagogical challenges and goals of the Finnish comprehensive school.

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APPENDIX 1

THE FINNISH EDUCATION SYSTEM*

The Finnish education system consists of comprehensive school education (the primary and lower secondary level), post-comprehensive general and vocational education (the upper secondary level), and finally, higher and adult education (the tertiary level). For all these levels, and moreover, for the pre-primary level, Finland has two parallel systems, one for Finnish-speaking (94% of the population) and the other for Swedish-speaking (6%) students, with Swedish-speakers mainly living in coastal areas in the south and west as well as in the self-governing Province of Åland. Both these systems have, on a national level, identical educational goals.

The officially expressed future goal of Finnish education policy is threefold – to streamline the education system, to develop it in line with the principles of equity and lifelong learning, and to make it internationally competitive.

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* Adapted from: http://www.minedu.fi/minedu/education/index.html

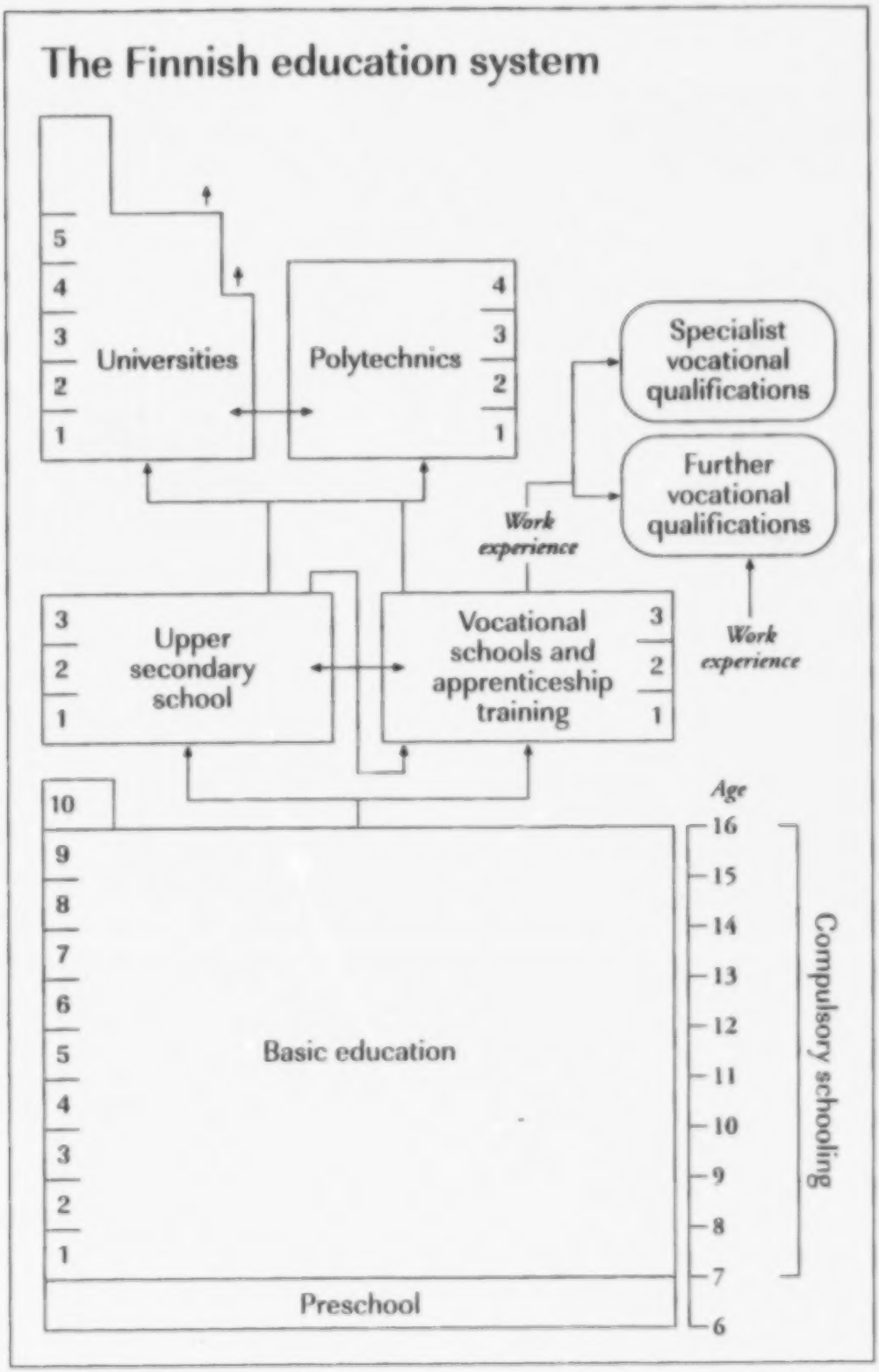
Preschool and basic education

In Finland, children generally start school at the age of seven. Before going to comprehensive school, children may participate in one-year preschool education, mainly provided by social authorities at day-care centres. However, only about 10 per cent of preschool education is arranged by education authorities. Free preschool education is provided for children aged 6 in conjunction with comprehensive schools. Nowadays, about 93 per cent of all 6-year-old children take part in preschool education.

Finland has nine years of compulsory schooling. Usually, for the first six years of comprehensive school, the children are taught by a class teacher, who generally teaches all or at least most subjects. Then, during the last three years, the different subjects are taught by specialised subject teachers. In Finland, 99.7% of the age group complete compulsory schooling.

The school network covers the whole country. Comprehensive schools are primarily run by local authorities, with the exception of a few private schools. The government contributes to the financing of all schools. For children, the teaching and educational equipment are free of charge. In addition, pupils get one free warm meal a day. This tradition of free school meals goes back fifty years. As a rule, transportation is arranged by the education provider for distances of 5 km and over. The smallest schools have fewer than ten pupils, and the largest ones 900. There are some 4,300 comprehensive schools in Finland. The schools can develop individual profiles by focusing on some area, such as languages, mathematics, sciences, sports, music or arts.

Statutes determine the core subjects which all pupils study, and the government determines the national objectives for education and the number of classroom hours allocated to each subject. At comprehensive schools, all pupils thus study the same core subjects with similar instructional contents. Besides this, learning usually takes place in heterogeneous groups. All this means that the core programme is almost identical to all students. Yet, of all


The Finnish education system
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2
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Universities
4
3
2
1
Polytechnics
Specialist vocational qualifications
Further vocational qualifications
Work experience
Work experience
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2
1
Upper secondary school
Vocational schools and apprenticeship training
3
2
1
10
9
8
7
6
5
4
3
2
1
Basic education
Preschool
Age
16
15
14
13
12
11
10
9
8
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6
Compulsory schooling

classroom hours about 20 per cent are reserved for optional subjects freely chosen by the pupil and his or her parents. Optional studies may include courses in, for instance, foreign languages, sports, art and music, or integrated or in-depth courses or applied studies in the core subjects.

Both comprehensive schools and general upper secondary schools have a broadly based system of counselling that underpins the development of the pupil and provides guidance in studying, career planning and choice of further studies. The purpose of counselling is to ensure that every young person leaving school is aware of what choices of further education are open to him or her and what working in the adult world entails, and that the pupil has a clear plan for his or her own future.

Pupils with learning difficulties are entitled to remedial education. Since 1997, educational authorities have been responsible for the education of all children, including those with profound developmental disabilities. The aim is to integrate special-needs education as far as possible into ordinary schools, but there are those who benefit more from separate special-needs education.

There is no actual graduation certificate or qualification to be gained upon completing comprehensive school, but once one's compulsory education is over, it opens the way to all secondary education options, i.e. different types of vocational training or upper secondary school.

Upper secondary school (academic) and vocational institutes

After comprehensive school, young Finns can choose between general and vocational upper secondary education. Half of them opt for general upper secondary education. Like comprehensive schools, some of the upper secondary schools also specialise in a particular subject; currently there are 50 specialised schools. General upper secondary education comprises a minimum of 75 courses (each comprising 38 class hours), 45–49 of which are

compulsory. The curriculum has been designed to extend over three years, but because there are no specific year classes pupils may graduate in a longer or shorter time than this.

Upper secondary school ends in a national matriculation examination, which comprises tests in the mother tongue (Finnish/Swedish/Sami), the second national language (Finnish/Swedish), the first foreign language, mathematics and general studies. It is possible to take tests in optional languages in addition to the compulsory foreign language. The matriculation certificate provides eligibility for higher education.

In Finland initial vocational education and training is mainly institution-based. Measures are being taken to add to the share of work-based learning in vocational education. Young people increasingly study for qualifications in apprenticeship training. In addition, longer periods of on-the-job learning will be included in institutional training programmes. All secondary level vocational programmes take three years to complete; of this time a minimum of six months is devoted to practical on-the job training.

Administration and resources

Nearly all publicly funded education, from primary to higher, is steered or supervised by the Ministry of Education. The existing private institutions also rely heavily on public funding, and the education they provide is subject to public supervision. The universities are state institutions and funded directly from the state budget; the central and local authorities provide most of the funds for the other educational institutions.

The Ministry of Education is in charge of the administration of education, research, culture, youth issues and sports; its remit includes all universities. In matters related to comprehensive and upper secondary schools, vocational institutions and adult education, the Ministry is assisted by an expert agency, the National Board of Education.

In Finland, public education accounts for 14 per cent of all public expenditure. Some two thirds of this consists of State funding and one third of municipal funding. Trends in education budgets were favourable until the early 1990s. Public expenditure on education accounted for some 6.0 per cent of Finland's gross domestic product in 1990. Following a sharp downturn in GDP, education spending rose to 6.8 per cent in the early 1990s. In 1996 public expenditure on education accounted for 6.4 per cent of Finland's gross domestic product.

APPENDIX 2

TEACHER EDUCATION*

Historically, teacher training in Finland has taken shape gradually and separately for each school type and even for each individual type of teaching assignment. However, the idea about academic training for all teachers, including also primary and even kindergarten teacher training, has a long tradition in Finnish educational discussion.

Prior to the comprehensive school reform of the 1970s, the issue of teacher training was the subject of many major controversies. The issues to be solved included the unification of teacher training and the implementation of the principle of a single degree, the transfer of training from teacher training colleges to institutions of higher education and the harmonisation of theoretical and practical training, on the one hand, and pedagogy and other disciplines, on the other. The Teacher Education Act was ratified in December 1971, and resulted in the final transfer of training for comprehensive and upper secondary school teachers to the university sector. New teacher training objectives were drawn up for comprehensive and upper secondary school teachers, according to which training was divided into class and subject teacher training. This division still applies today.

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* Adapted from: http://www.edu.fi/projektit/opepro/english/index.html

University-level teacher training is currently provided by eleven universities in Finland. The teacher training system is twofold: part of the responsibility for training lies with the faculties of education, while another part is carried out in co-operation with the faculties of different teaching subjects. The faculties of education are responsible for training kindergarten teachers, class teachers, special education teachers and student counsellors, as well as teachers of home economics, technical work and, to some extent, music teachers too. Other subject teachers are trained in co-operation between departments of teacher education and different subject departments.

Class teacher training

Class teacher training leads to the Master's degree in education. The premise of the training is for students to familiarise themselves with holistic human development as well as interaction between the teacher and the learner. The students are further expected to familiarise themselves with scientific theories concerning the educational, learning and development process and their applications to practical educational work so as to be capable of creating their own meaningful working theories.

The training emphasises the theoretical and methodological contents of multidisciplinary educational science and the subjects taught at school and their practical applications. The objective is to link teaching and study to scientific research in order for students to become capable of independently analysing and solving educational problems and of developing their work through research.

The main subject in class teacher training is education. It will provide the theoretical foundation for discharging teaching duties. A further objective of the educational studies is to lead students to scientific thinking and research. The scope of the Master's degree in education is 160 credits, and students with the degree are eligible for postgraduate studies in education. The pedagogical studies of teachers are partially included in the studies in education.

The degree usually consists of the following study modules:

- language and communication studies or equivalent, 12 credits;
- education, 75 credits;
- teachers' pedagogical studies, 35 credits;
- multidisciplinary studies in the subjects and thematic subject modules taught at comprehensive school, 35 credits;
- subsidiary subject studies, 30–35 credits (including either two basic study modules with a scope of 15 credits each or one subject study module with a scope of 35 credits);
- free-choice studies, 3–8 credits.

In recent years, several degree programmes with different emphases have been launched in class teacher training, such as English-language class teacher training, multiform training intended for adult students, a degree programme with emphasis on education in media and communications, and a degree programme focusing on the application of technology.

Subject teacher training

Subject teacher training includes studies in one or two teaching subjects and the teachers' pedagogical studies as part of the Master's degree. A teaching subject means a subject included in the curriculum of basic education, upper secondary school or some other educational institution. Studies in a teaching subject mean studies that promote the command of the subject as required by teaching work. Teaching subject studies consist of advanced studies in one subject, with a minimum scope of 55 credits, and subject studies in a possible second subject, with a minimum scope of 35 credits.

Subject teacher training is provided by universities in accordance with the division of work laid down in decrees governing degrees in different fields. The training is divided into two tracks: the faculties of education are responsible for some training, while another part of the training is carried out in

co-operation between teacher education departments and different subject departments. The faculties of education are responsible for the training of subject teachers in home economics, textile work, technical work and, to some extent, subject teachers in music, as well as special education teachers and student counsellors.

Subject teacher training is regulated by field-specific decrees. Students apply directly to subject teacher training (such as training for subject teachers in mathematics, physics and chemistry or religion). In addition, it is also possible to graduate as a subject teacher by separately finishing the teachers' pedagogical studies upon completion of a university degree.

For the majority of people who complete subject teacher training, the pedagogical studies consist of study contents orientating towards teaching work. The pedagogical studies of teachers provide students with the pedagogical capabilities required for independent performance of teaching duties at comprehensive schools, upper secondary schools and other educational institutions. These studies may provide specific orientation towards teaching duties at comprehensive and upper secondary schools as well as at vocational institutions or in adult education and training.

The basic objectives of the pedagogical studies are to

- develop those extensive learning and competence skills of students which current and future society requires of the teaching profession;
- train experts in the field of education and teaching, who are capable of facing changes in society and in the living environment, because the role of future teachers and educational experts will be to support the skills- and knowledge-related, socio-ethical and psychological growth and development of children, young people and adults.

The training places emphasis on students' own commitment, self-direction, and personal and collaborative learning experiences in their growth towards becoming teachers.

Strong theoretical thinking, reflection on and evaluation of one's own actions and development as well as guidance towards good teaching practices are very important in the studies. The objective is for students to develop into teaching professionals, who will develop their own work and working community.

The scope of the studies is 35 credits (the subject study module in education), and students may include these in their degree as a subsidiary subject. The studies consist of the following themes, for example:

- education, schooling and culture, 9 credits;
- learning environments and interaction, 9 credits;
- research and professional practices in education, 8 credits;
- specialist and advanced studies in professional practices, 9 credits.

The total annual intake to subject teachers' pedagogical studies is about 1,500 students.

Student counsellor training

In the Master's degree, training for student/pupil counsellors includes a main subject in some field of education, the teachers' pedagogical studies either as part of the main subject or as a separately completed study module and studies in student counselling. The scope of student counselling studies is 35 credits, and they provide professional capabilities for student counselling. Studies in student counselling may also be completed separately upon completion of an appropriate degree or training. People may apply for separate studies in student counselling, if they are qualified to teach in basic education, at upper secondary schools or vocational institutions, or if they

have completed some other higher education degree and have worked in teaching and counselling assignments.

Training for special education teachers

Training for special needs teachers and special class teachers leads to the Master's degree in education. This Master's degree includes special pedagogy as the main subject, the teachers' pedagogical studies either as part of the main subject or as a separate study module and studies in special education. The scope of special education studies is 35 or 50 credits, and they provide professional capabilities for special education assignments. The training also includes elective subsidiary subject studies.

In addition, training for special class teachers, similar to ordinary class teachers, includes multidisciplinary studies in the subjects and thematic subject modules taught at comprehensive school with a scope of 35 credits. Special class teachers gain broader teaching qualifications than special needs teachers to teach within both part-time special education and class education.

The studies in special education may also be completed as a separate study module upon completion of an appropriate degree or training. Students admitted to separate studies in special education are either qualified class teachers or have completed some other higher academic (Master's) degree or a higher education degree appropriate in the field of special education for children with intellectual disabilities. Training in pre-primary level special education is open to kindergarten teachers.

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The success of Finnish students in PISA has been a great joy but at the same time a somewhat puzzling experience to all those responsible for and making decisions about education in Finland. At a single stroke, PISA has transformed our conceptions of the quality of the work done at our comprehensive school and of the foundations it has laid for Finland's future education and development of knowledge.

Thanks to PISA, Finnish schools and school practices have suddenly been brought into the focus of international attention. Why are Finnish students performing so well? What is the secret behind the Finnish success?

In this publication, we as the researchers responsible for the implementation of PISA in Finland, try to open up some perspectives on the possible reasons underlying the high performance of Finnish students in PISA. There is, in fact, no one single explanation for the result. Rather, the successful performance of Finnish students seems to be attributable to a web of interrelated factors having to do with comprehensive pedagogy, students' own interests and leisure activities, the structure of the education system, teacher education, school practices and, in the end, Finnish culture. Perspectives on this web of explanations will be opened up not only by analysing the results of PISA but also by considering some characteristics of the Finnish education system and our cultural heritage which, both at and outside school, can be thought to have contributed to Finland's successful performance.

OECD PISA

OPETUSHALLITUS

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